

URBAN DWELLING ENVIRONMENTS: CHONBURI, THAILAND

by

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1974

Submitted in partial fulfillment of the requirements

for the degree of

Master of Architecture in Advanced Studies

at the

Massachusetts Institute of Technology

June, 1976

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ABSTRACT

This is a study of existing urban dwelling environments in Chonburi, Thailand. The study is a reference for understanding the dwelling environments/situations of urban areas and intended as a tool for the formulation of housing policies in Chonburi, Thailand.

The study provides a set of alternative guidelines for identifying the dwelling/land systems in urban areas of Chonburi following a methodology developed in the Urban Settlement Design in Developing Countries Program.

General projections are made through a comparative analysis of four case studies to evolve an urbanization alternative for the future development of an existing site and services project in Chonburi.

Thesis Supervisor: Horacio Caminos
Title: Professor of Architecture

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Case Studies, Urbanization Alternative

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May 1976

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PREFACE

CONTENT: This study identifies and analyses different existing dwelling/land situations in Chonburi, Thailand, based upon the basis of a survey, evaluation and comparison of four selected localities.

These localities represent the full range of residential developments in Chonburi from very low to upper middle and high income groups in varying densities.

The physical environments of each of the dwelling systems are described in terms of land utilization, layout, subdivision and provision of utilities and services. The dwelling systems are analyzed at four levels: the locality of that system, a selected 400x400 m. segment within the locality, a selected block of the segment and a typical dwelling unit through drawings, charts, graphs and photographs. Availability/provision and level of services for each dwelling system is presented in a comparative form.

A proposal has been prepared as an alternative model of an existing government site and services project at Tambol Sa-Med, Chonburi, which is presently under construction. The lack of adequate financial support and planning procedures make the project progress with slow pace. An attempt has been made to

analyze the basic growth that will be taken place on the site, assumptions, projections, proposed land use plan, circulation plan and initial development plan have been made to serve as an illustration of guidelines for the future development of the project.

PURPOSE: This study attempts to:

- a) identify and analyze the physical structure of different housing systems in Chonburi, based on their physical and socioeconomic condition;
- b) provide a comparative framework for the analysis, comparison, contrast and evaluation of the physical residential developments;
- c) give the guidelines for more realistic and effective physical land utilization policies.

APPLICATION: This study can be used as a reference source and tentative set of guidelines for those concerned with the planning of residential developments in Chonburi, Thailand.

DATA: This study is derived from the field surveys carried by the author during the summers of 1974 and 1975; complemented by maps, air photographs, charts, graphs and mentioned bibliographic material. The case study analysis is based on a methodology developed in the Urban Settlement Design in Developing Countries Program, directed by Professor Horacio Caminos.

INTRODUCTION

At present, Bangkok is the Premier City of the country, it is the centralization of all the most important activities. The existence of the only port of international importance and the only international airport, together with the highway and railway networks radiating from Bangkok make it the hub of the transportation system of the country. Bangkok is the cultural capital having almost all the institutions of higher education, the political capital where decisions are taken regarding the entire country, and also the economic capital where industrialization is proceeding at a rapid pace. In fact, it is the metropolis which acts as a centripetal force for the entire nation. Due to these factors, the growth of Bangkok has increasingly overshadowed those of the other cities in the country. The population has increased at an average of 5.2% a year since 1955, and amounts to over three million at present. The provision of public services, utilities and transport facilities has never been able to keep up with this pace of growth, thus resulting in congestion and severe deficiencies in all amenities.

To relieve pressures from Bangkok, the Greater Bangkok Development Plan 1990 (GBDP), by the City Planning Division, the Ministry of Interior, proposed the establishments of industrial estates in the provinces of Samut Sakorn, Nakorn Pathom and Chonburi, which are the areas

of direct influence of Bangkok or zone diffused urbanization. The plan to encourage growth in these three provinces may reduce the number of migrants to Bangkok, thus reducing the burden of overspill.

Chonburi is chosen for this study because of its importance to the eastern region, not only being the recommended industrial estate, but also the location of the first deep-sea port which is proposed by the GBDP to be implemented at Lam Chabang, approximately 30 kilometers to the south of the Municipal City. It is obvious that the new deep-sea port will strengthen the potential of growth which will take place in these parts of the coast, and the influence of the port upon the growth of industries is expected to cover nearly the whole eastern coast of the Gulf of Thailand.

This study is intended as a contribution toward a better understanding of the existing dwelling/land situations of various dwelling systems in Chonburi, and to serve as a basic in formulation of future policies for residential development in the City.

The study is presented in sections as follows: Chonburi Urban Context, Case Studies, Evaluations, Site Context and Proposed Development Plan. The following provides an overall view of the contents:

URBAN CONTEXT: This brief section is a contextual reference for the major subject of the study. It will give the reader a quick overview focused on specific pertinent information.

CASE STUDIES: The four selected dwelling environments include the full housing spectrum from very low income to high income groups in varying densities. Each case is summarily described in a similar descriptive manner. Complete localities, selected small subsections and dwellings are examined in detail for each case. The cases provide the material with which to identify basic patterns in different aspects of the housing process, particularly on land utilization and density. The selection of the residential cases were categorized by USER INCOME GROUP to cover very low, low, moderately low, middle and high income sectors.

EVALUATIONS: The cases are compared to focus on specific aspects:

- TIME/PROCESS PERSPECTIVE: All the four cases are grouped into representative models of existing housing situations to illustrate different cases of land utilization.
- PHYSICAL DATA MATRIX: The matrix allows a comprehensive overview and cross-comparison of information from all cases.
- COMMUNITY FACILITIES, UTILITIES/SERVICES: The matrix is a comparative summary of the dwelling indicators related to the facilities, utilities/services provided.
- LAND UTILIZATION: This section provides a simple graphic method of showing land subdivision patterns, land utilization percentages, and densities for each case in order to permit rapid interpretation, comparisons, and evaluations.

URBANIZATION ALTERNATIVE: This section is a comparative study of the existing development of the Sa-Med Site and Services Project in Chonburi, presently under construction. The possibility of comparative analysis is the main reason for this study which focuses on the physical layout and land subdivision.

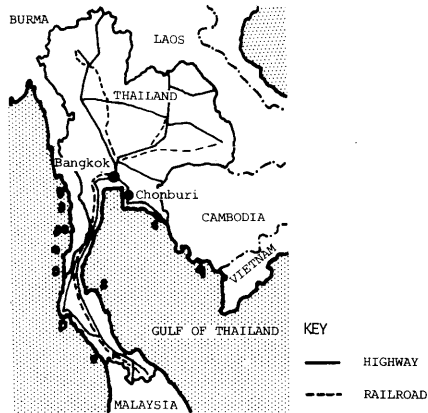
A comparative study of the existing land development/situations is made through assumptions and projections to serve as a contributing factor to understand the needs of all the factions that relate to the project. Finally, proposed land use, circulation and development plans are made to serve as an urbanization alternative for the future development of the project.

The section in the Urbanization Alternative contains:

- INTRODUCTION: Introduction to the existing Sa-Med Site and Services Project in Chonburi.
- BASIC DATA OF THE SITE: The physical character and problems of the site.
- EXISTING SITE DEVELOPMENT: The physical existing development on the project site.
- PROJECTIONS: The assumptions and projections of growths that will be taken place on the site; land use, land value, population density, income groups, basic subdivision, dwelling types, number of population and required schools.
- LAND USE: Includes the planning criteria and general outline for the proposed land use plan.
- CIRCULATION: Includes the planning criteria and general circulation patterns.
- DEVELOPMENT MODE: Includes the development criteria and proposed development stages.

CHONBURI, THAILAND

URBAN CONTEXT



1. PRIMARY INFORMATION: Chonburi is an eastern coastal province, approximately 100 kilometers southeast of Bangkok. It is located at latitude 13°22' north, longitude 100°28' east. The climate is tropical dominated by monsoon. There are 3 seasons: rainy (July-October), cool (November-February), and hot (March-June). The province covers an area of 4,484 square kilometers with a population of 542,000 in 1970. The Chonburi Municipal City itself has an area of 4.5 square kilometers with a population of 55,000 in 1975.

2. HISTORY: Chonburi was founded in 13th century. It was considered as a Third-Class Town during Adutthaya Dynasty. Once, it was called Pla-Soi. It was under the authority of The Ministry of Water Affairs since the reign of King Rama 1 - King Rama 4. It had been changed to be under the authority of the Ministry of Interior since 1895. Chonburi is now an important province for marine trade, agriculture and seaside resort.

3. ECONOMY: Its hinterland relies mainly on agriculture and fishing. The province itself acts as a part of marine trade with Bangkok and the nearby provinces. Its role as a major seaside resort of Thailand has a strong impact on the economic base. The province has had a considerable growth in the industrial sector. It is expected that the industrial growth would be highly accelerated once

the proposed project of the deep sea port at Laem Chabang, 30 kilometers to the south of the Municipal City, is implemented. The types of industry recommended to be promoted are: oil refinery, chemical products, manufacturing, ship building, iron melting plant, and other mechanized factories.

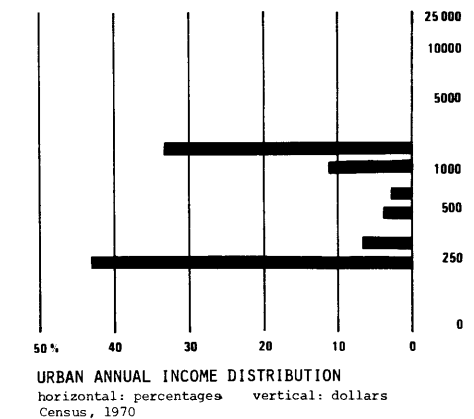
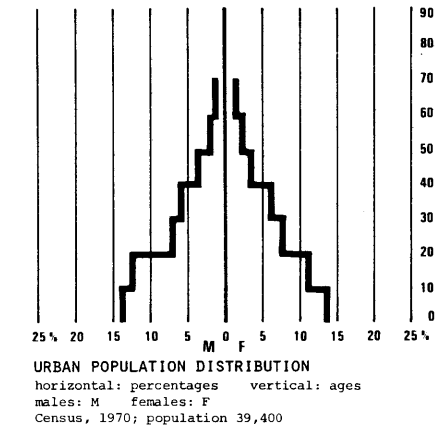
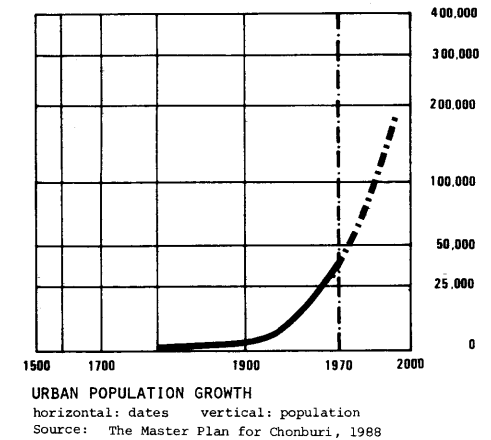
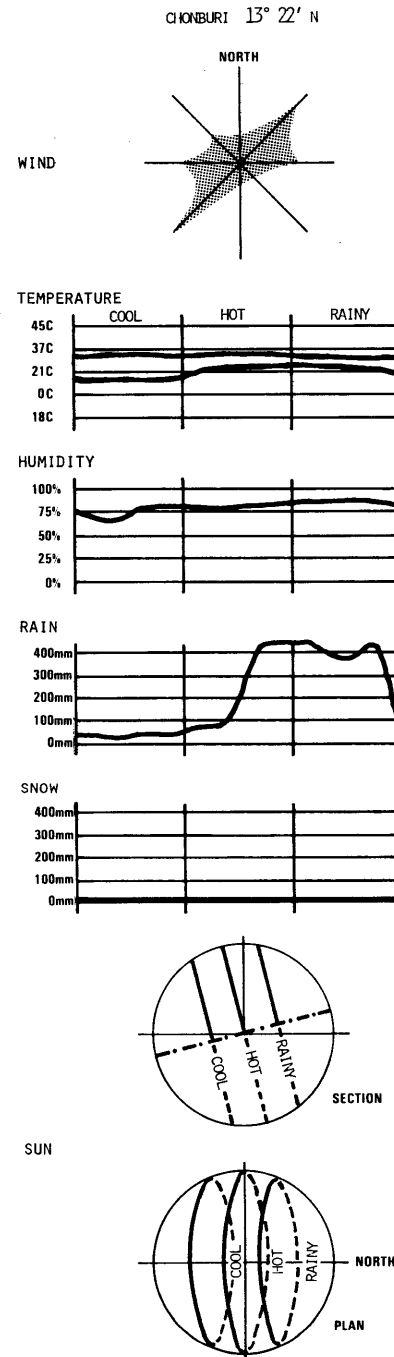
4. GOVERNMENT: The Chonburi Municipal City is the Provincial Capital and administration center, under the authority of an appointed Provincial Governor. The province is divided into 8 districts (amphur) which is headed by a District Officer who is directly responsible for district administration. Districts are also divided into 76 communes (tambol) and 534 villages (mu-ban).

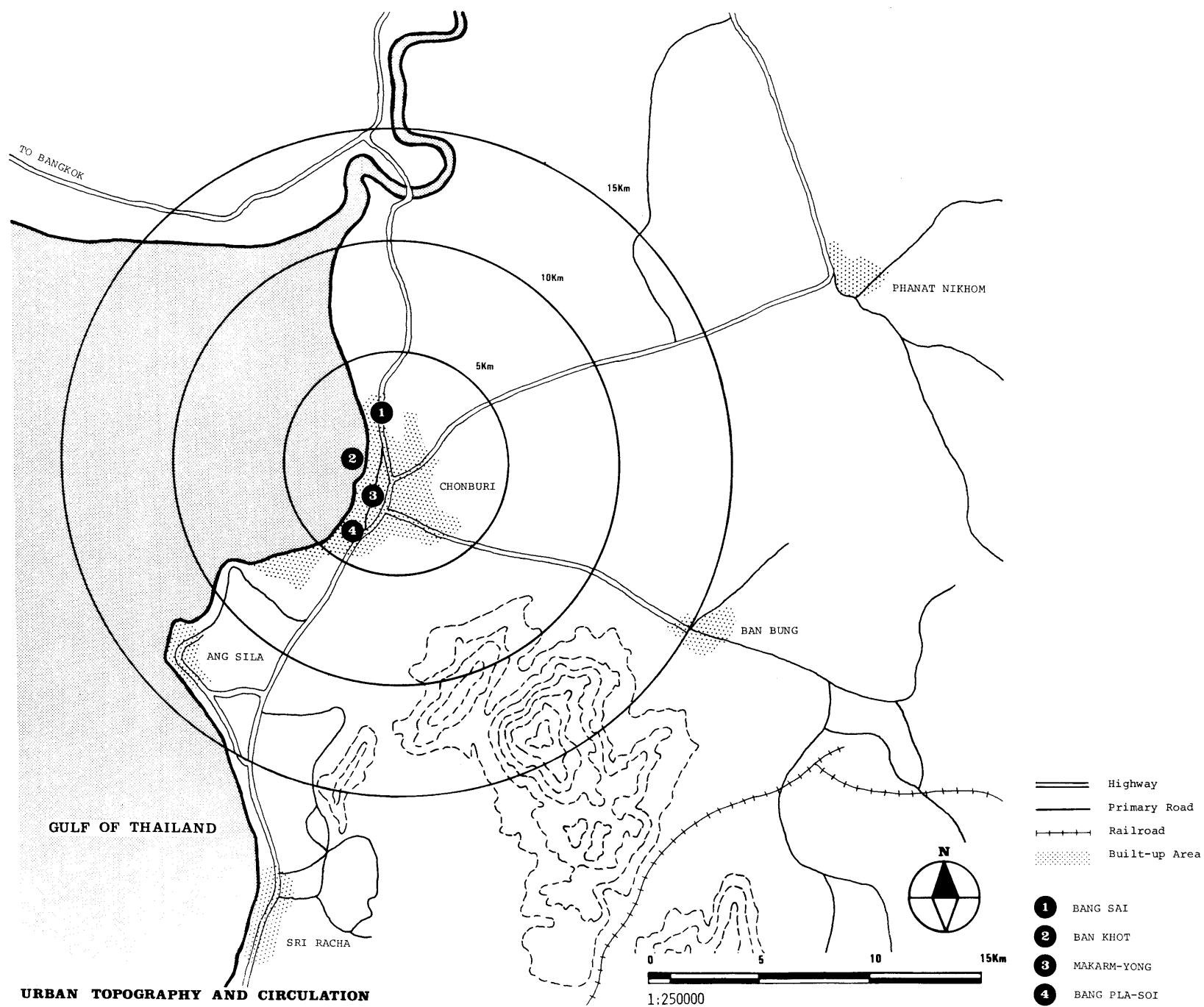
5. DEMOGRAPHY: The population in Chonburi Municipal City is approximately 55,000 in 1975, with annual growth rate of 3.36%. The projected population in the year of 1990 is 171,000 people. At present, 68% of the population is under thirty years of age, of which 51% are male.

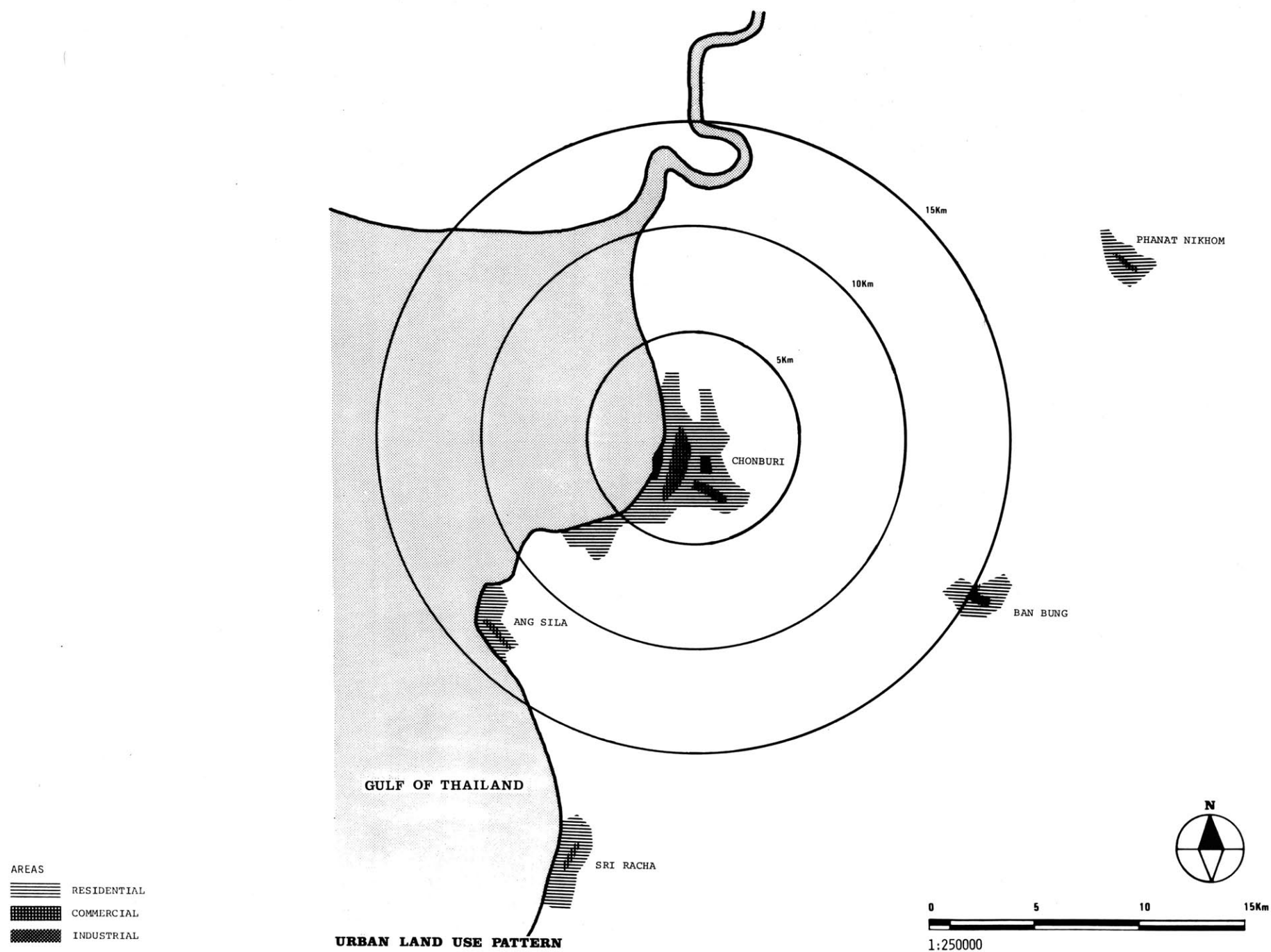
6. SOCIO-CUTURAL: The majority of the population is of Thai ethnic origin and mainly Buddhist. The rest is Chinese. 43% of the population is labor worker, 33% is in commercial, 11% work for public agencies, the rest are farmers, fishermen or working in light industries.

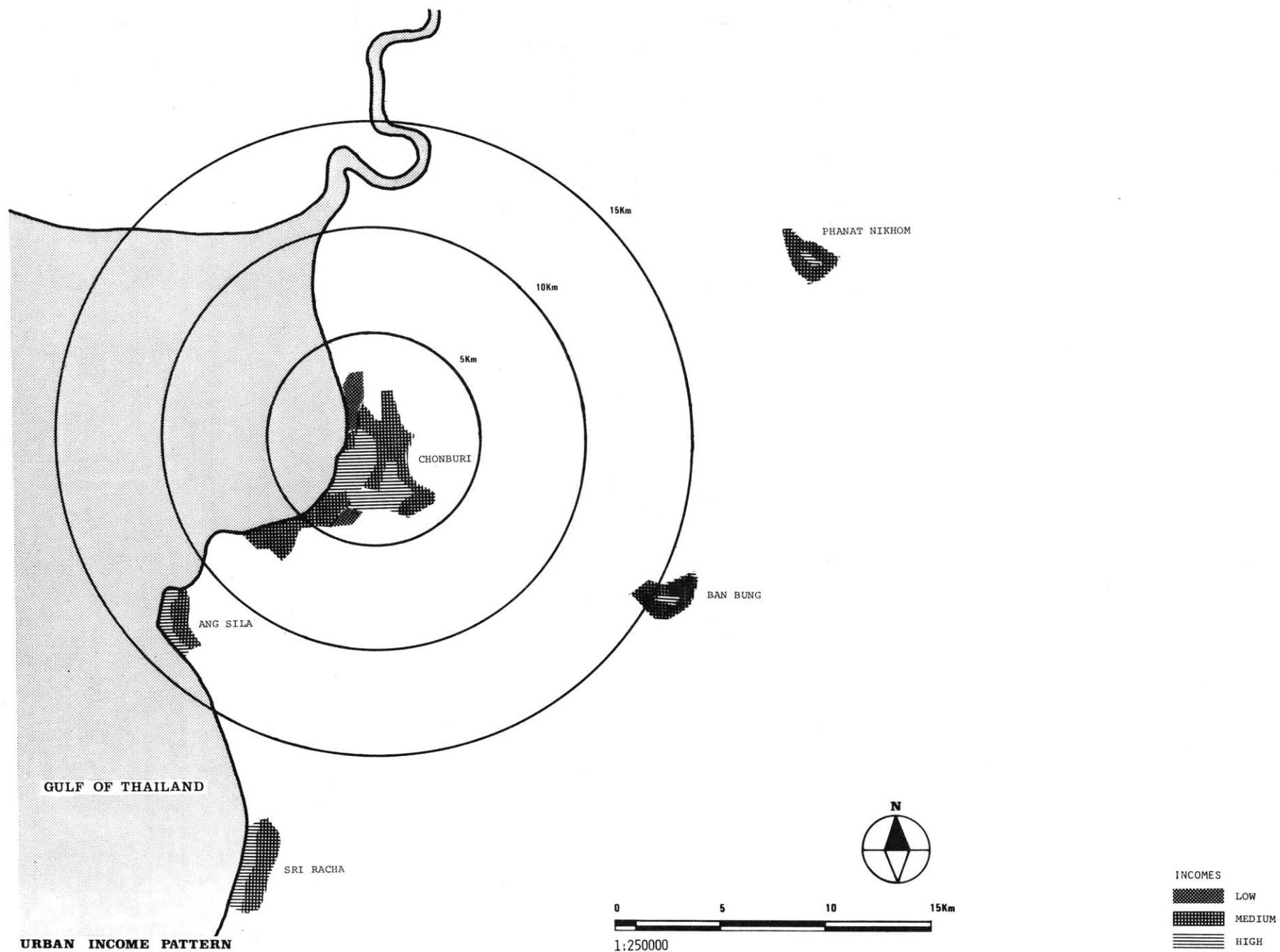
7. SOCIO-ECONOMIC: In 1969, the annual per capita income of Chonburi was estimated as US. \$850. The middle income sectors concentrates in the City Center which is the commercial district. The upper income sectors are dispersed throughout the outskirts of the City. The low income sectors live around the inner ring and periphery.

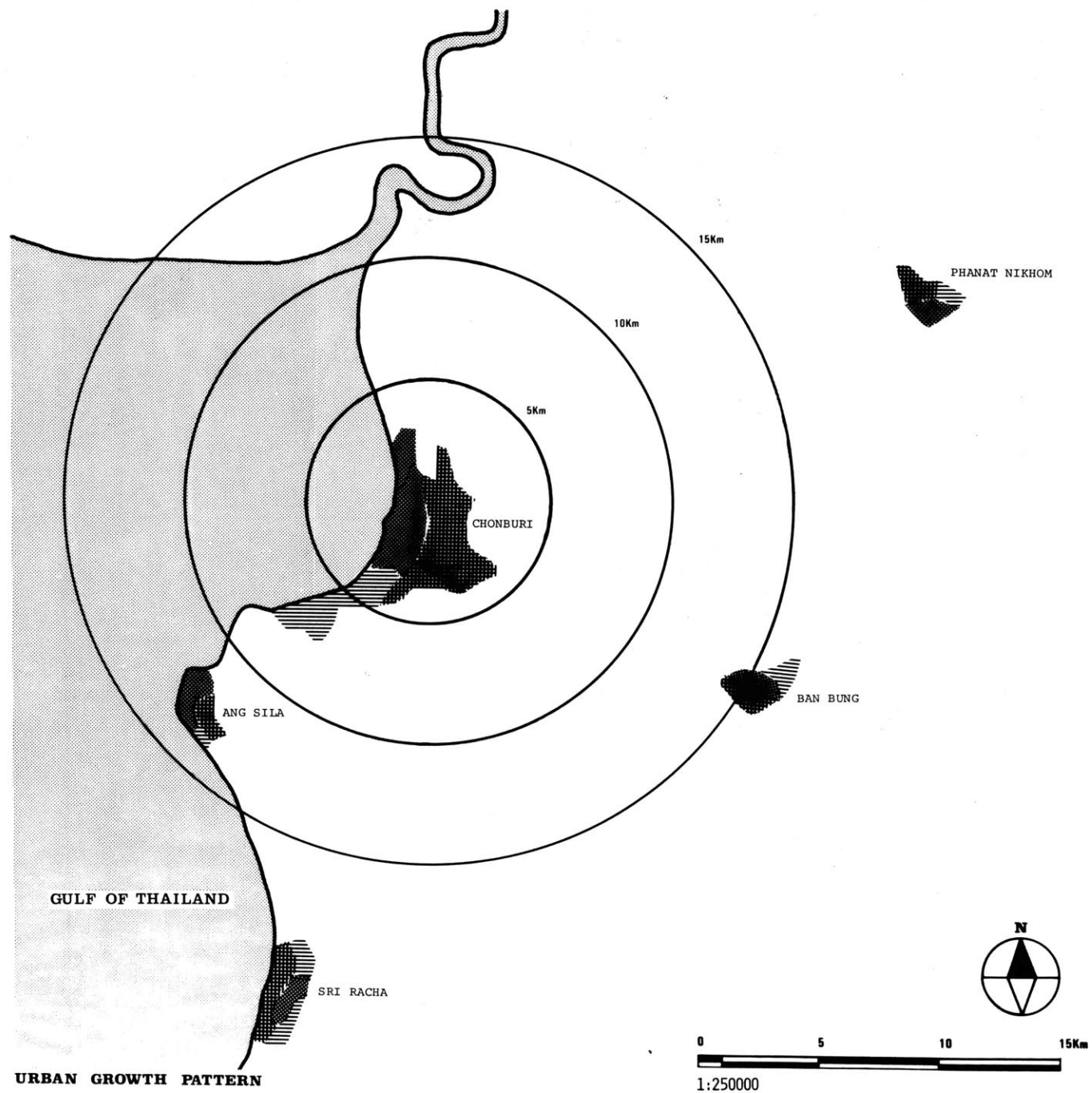
8. HOUSING: According to the 1970 report of population and housing census of Chonburi, by the National Statistical Office, 80.6% of the houses in Chonburi are made of wood, 40.4% of the dwelling are detached house type, 60% are row-houses. The majority of the houses has 1-2 stories.

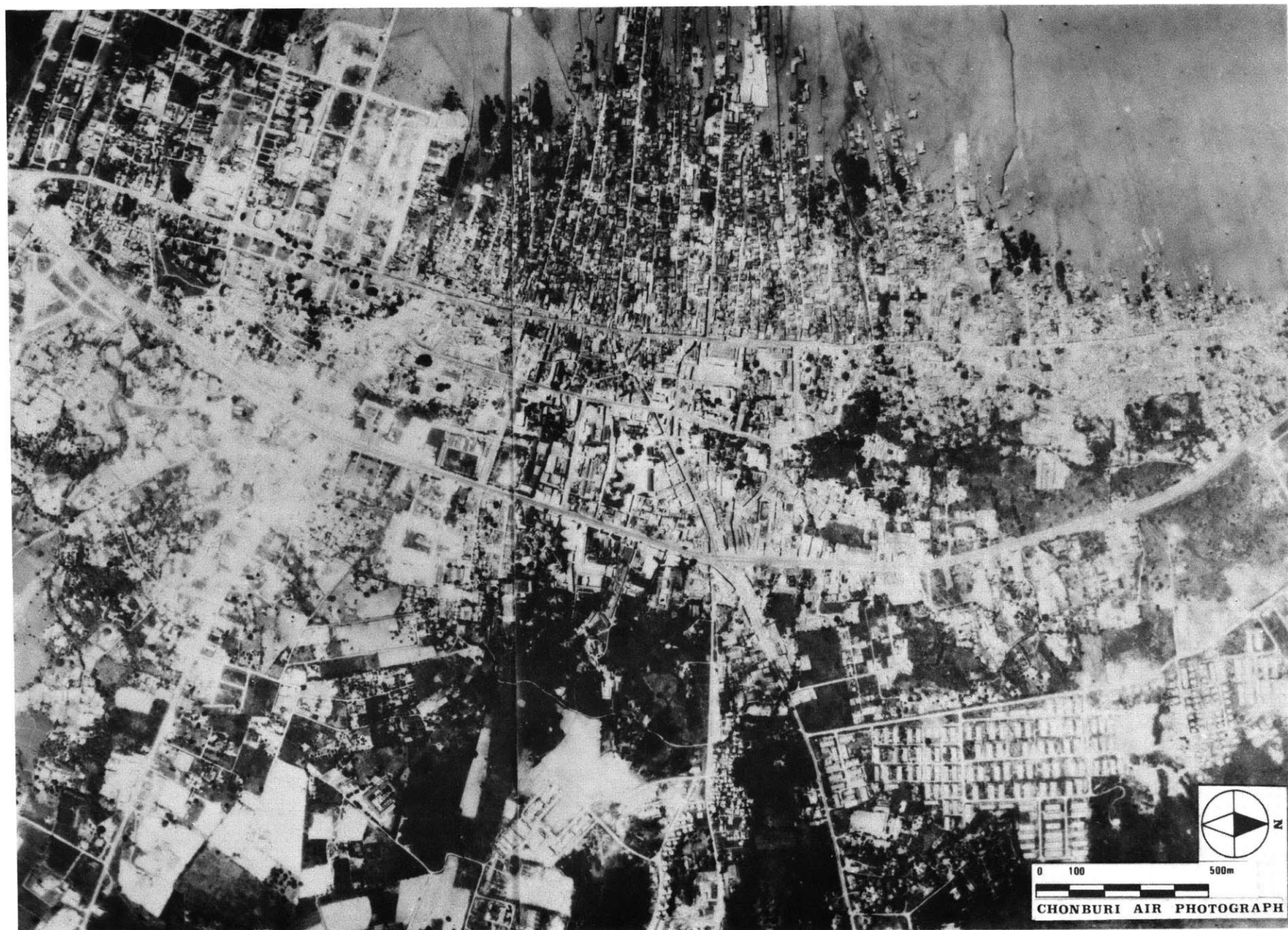












CASE STUDIES

The following section contains case studies describing selected dwelling environments/situations in Chonburi Municipal City at the present time.

The four cases were selected according to income groups, housing system and population densities.

Each case study is represented at four scales:

LOCALITY: A locality is defined as a relatively self-contained residential area in Chonburi Municipal City. In general, it is contained within physical boundaries.

LOCALITY SEGMENT: All the localities differ in size and shape. A segment of the same dimension has been taken from each locality for purposes of comparison. The size of the segment is 400 x 400 meters or approximately a six minute walk.

BLOCK: Within each locality segment, a typical residential block has been selected to allow comparison of land utilization (patterns, percentages and densities) that are homogeneous.

DWELLING UNIT: A typical self-contained unit for an individual, a family, or a group in each locality segment.

The four selected case studies are:

1. BANG SAI :

Private, very low/low income, medium density, farm houses.

2. BAN KHOT :

Private, low/moderately low income, high density, detached/row houses.

3. MAKARM YONG :

Private, middle/high income, high density, row-houses.

4. BANG PLA SOI :

Private, middle/high income, low density, detached houses.



1. BANG SAI



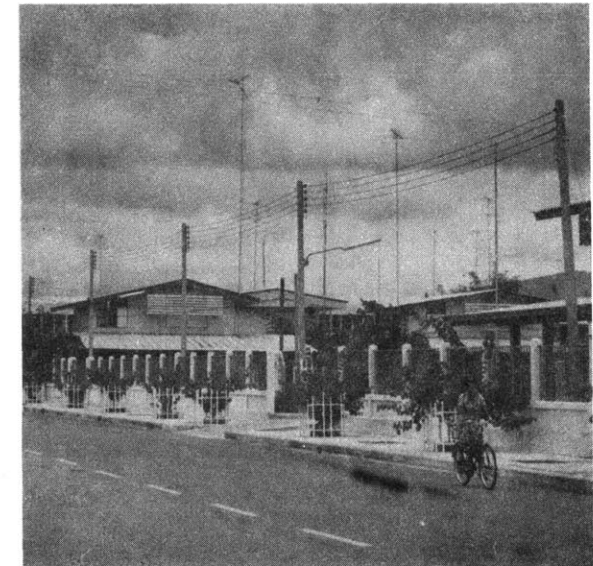
2. BAN KHOT (ON LAND)



(OVER WATER)



3. MAKARM YONG

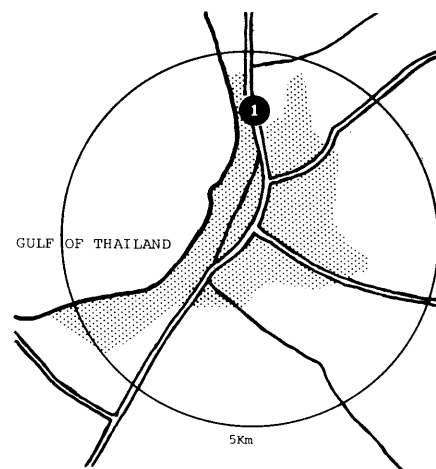


4. BANG PLA SOI

1 BANG SAI

Chonburi

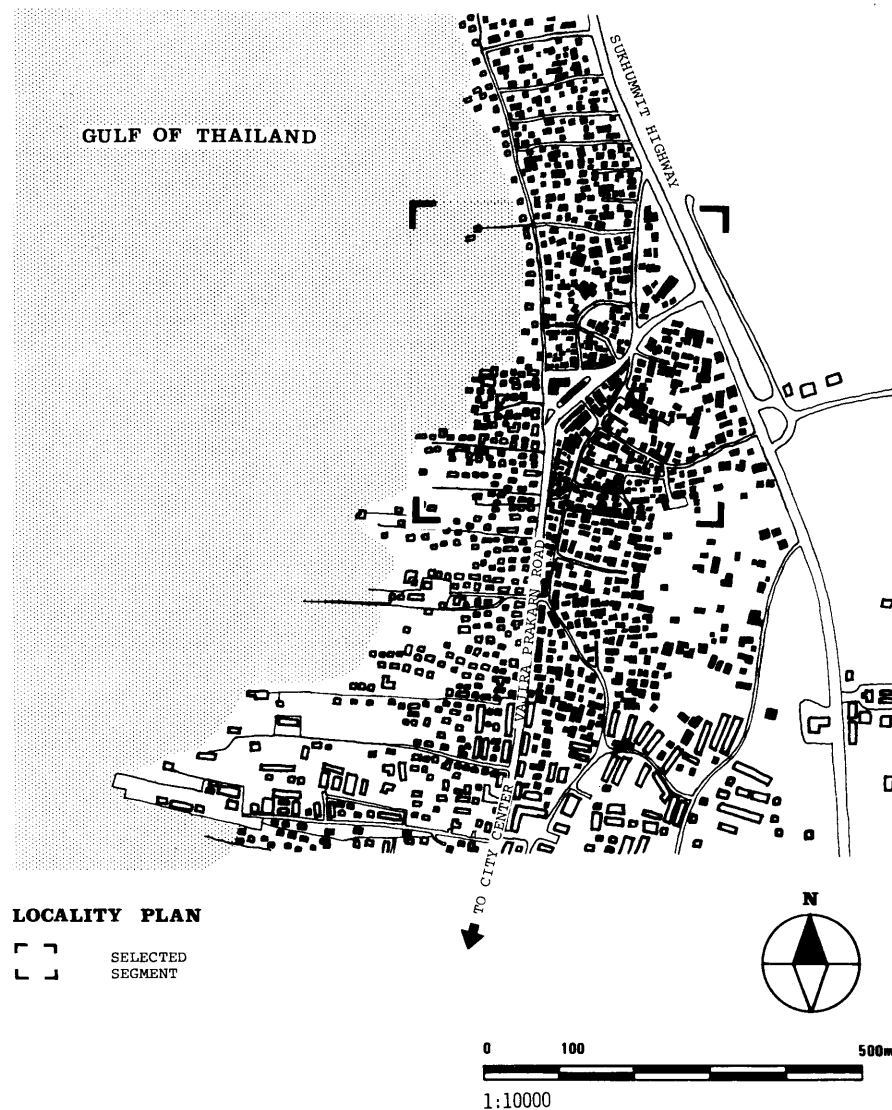
PRIVATE, LOW INCOME, FARM HOUSES



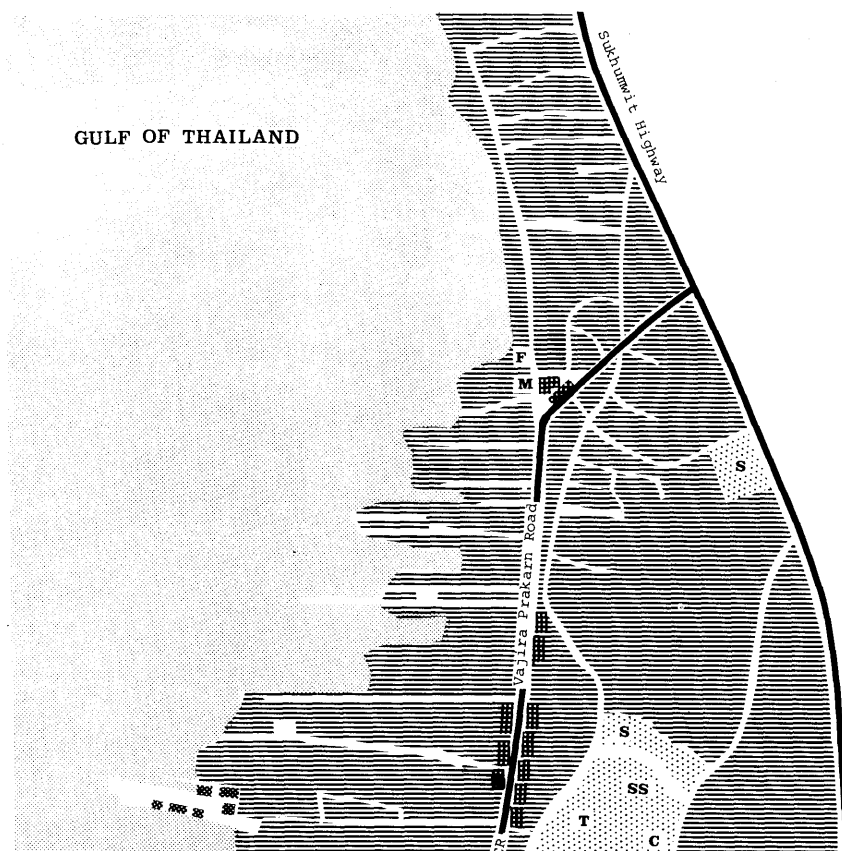
LOCATION: The locality is a predominate duck-farm community. It is located at the north of Chonburi Municipal City. It is the only sanitary district of the City, the others are municipal districts.

(Note: Under the provisions of the Municipality Act, any Sanitary District may be established as a Municipal District in future.)

ORIGIN: The community was established about 40 years ago. It was the community for duck-farms since then. Its production is one of the most important economic goods of the City.







LAYOUT: The locality is situated between Sukhumvit Highway and Gulf of Thailand. The area is bounded to the north and east by Sukhumvit Highway, to the south by local roads and Vajira Prakarn Road, and to the west by Gulf of Thailand. The lay out of the locality shows the unplanned development, where a new house is built wherever space can be found.




LOCALITY LAND USE PATTERN

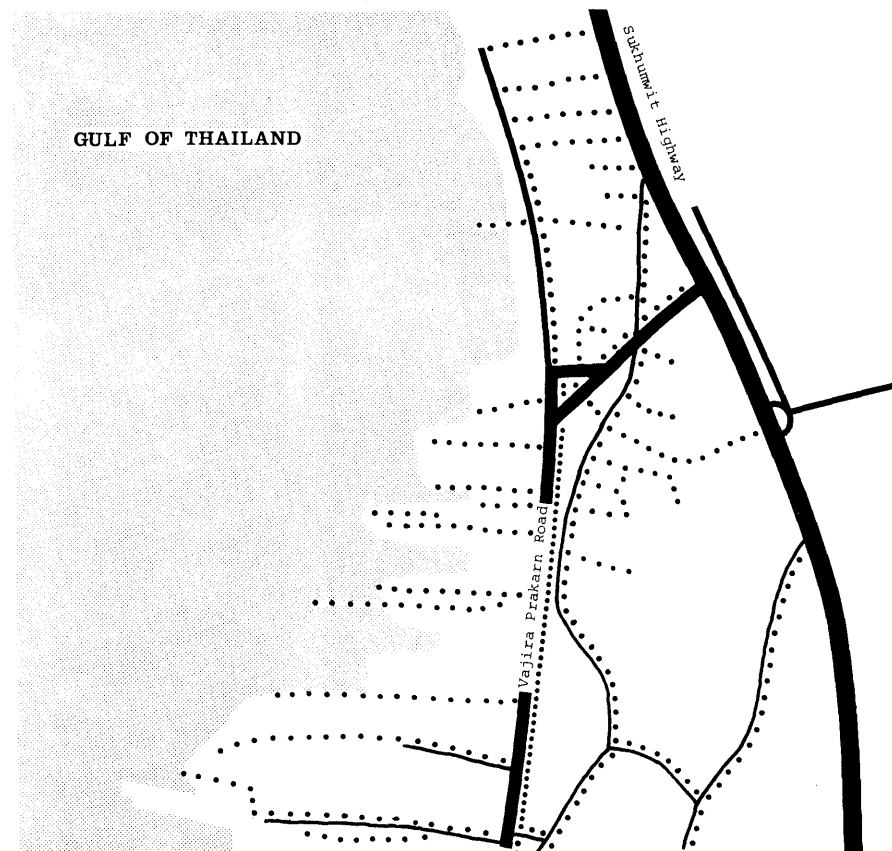
AREAS

-  RESIDENTIAL
-  COMMERCIAL
-  INDUSTRIAL
-  OPEN SPACES

KEY



- F** Fire Department
- S** School
- T** Temple
- SS** Social Services
- M** Market
- C** Cemetery
-  Bus

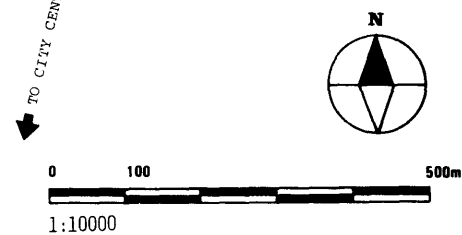
LAND USE: The land use of the locality is for the duck-farm purpose and living quarter. The farm area is usually located at the front yard of the lot. The dwelling unit is very close to the farm, thus it is very unhygienic. The locality has a higher percentage of land devoted to private uses than public/semi-public uses.



LOCALITY CIRCULATION PATTERN

KEY

-  VEHICULAR
-  PEDESTRIAN



CIRCULATION: The northern part of the locality is a pedestrian community with small circulation paths only. The locality has an access to Sukhumvit Highway from the east, this is used as the main access from the Highway to the City Center through Vajira - Prakarn Road.

POPULATION: In 1975, there were 1,223 households with the total population of 7,220, of which 4,515 are male and 2,705 are female. The majority of households consist of extended families. Over 50% of the population is under 20 years old.

INCOME: The majority of the households in the locality own a duck farm, each farm consists of about 200 to 2,000 ducks. The production from the farm has a strong impact on the economic base of the City. No income distribution data is available for the locality, but the annual income can be estimated at about \$500-\$900.

LOCALITY SEGMENT LAND UTILIZATION DATA

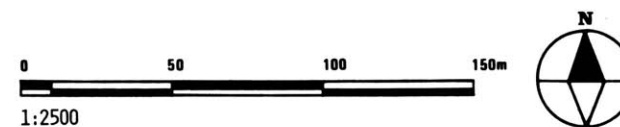
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	385	13	29
DWELLING UNITS	435	13	33
PEOPLE	2,175	13	167

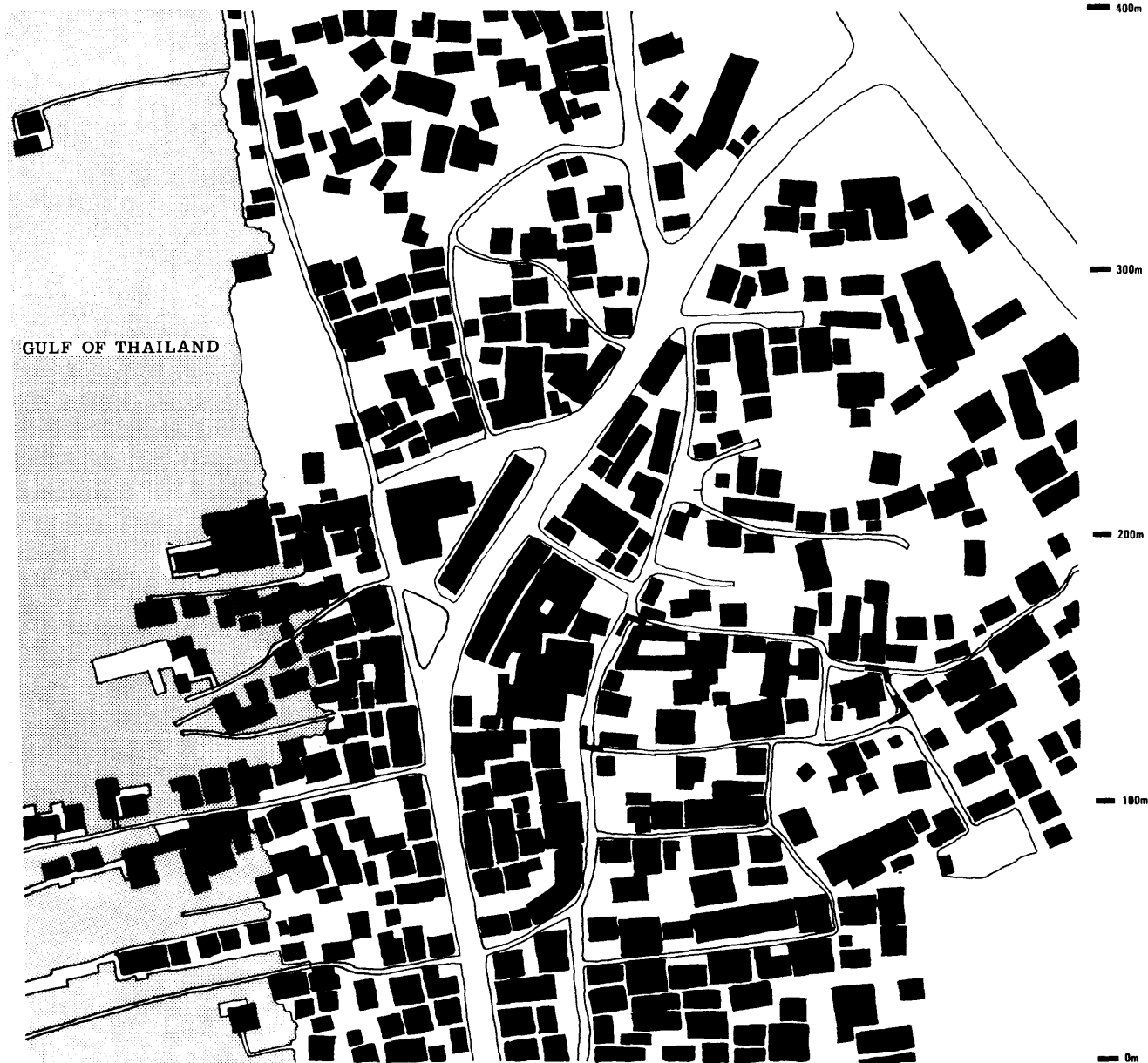
AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	1.2	9.15
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	11.8	90.85
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	13	100
WATER	3	

400m —
300m —
200m —
100m —
0m —

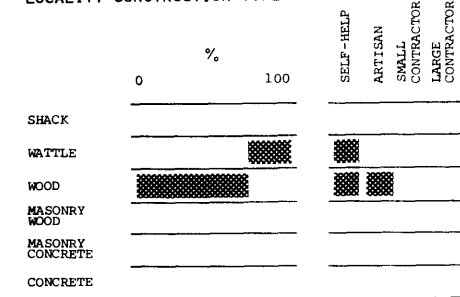


LOCALITY SEGMENT AIR PHOTOGRAPH





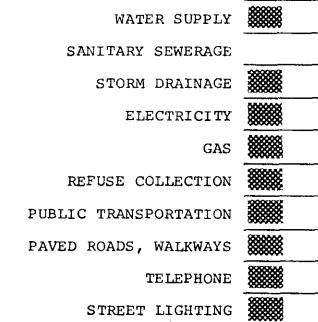
LOCALITY CONSTRUCTION TYPES



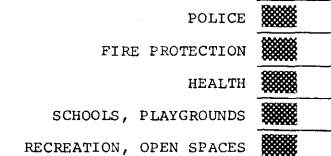
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate

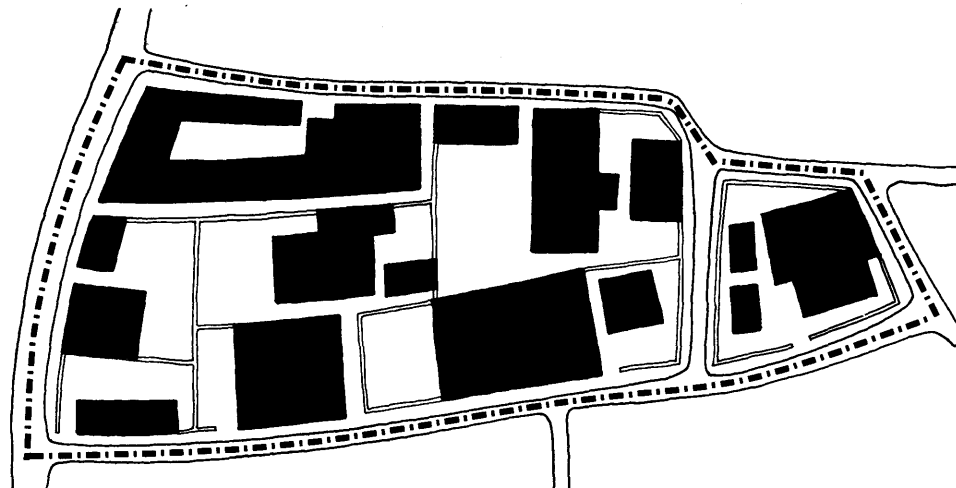
SELECTED BLOCK

LOCALITY SEGMENT PLAN



1:2500



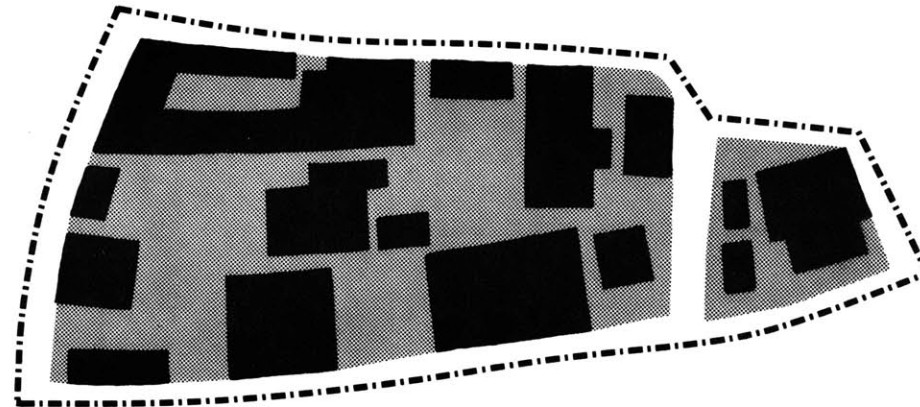


LOCALITY BLOCK PLAN



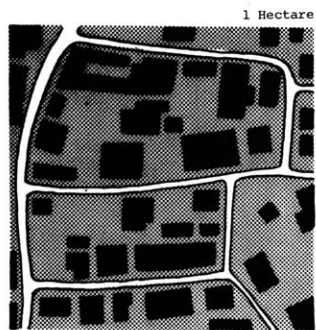
LOCALITY BLOCK LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	9	0.57	16
DWELLING UNITS	16	0.57	28
PEOPLE	80	0.57	140
AREAS			
		Hectares	Percentages
PUBLIC (streets, walkways, open spaces)		0.04	7
SEMI-PUBLIC (open spaces, schools, community centers)		-	-
PRIVATE (dwellings, shops, factories, lots)		0.53	93
SEMI-PRIVATE (cluster courts)		-	-
TOTAL		0.57	100



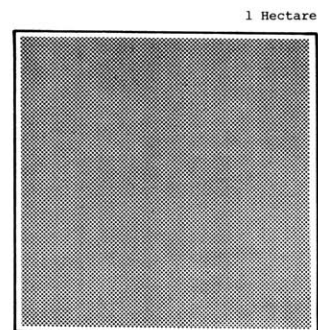
LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS



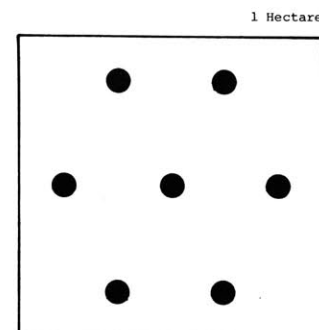
PATTERN

Public:	streets/walkways	
Semi-Public:	playgrounds	
Semi-Private:	cluster courts	
Private:	lots	
	dwellings	



PERCENTAGES

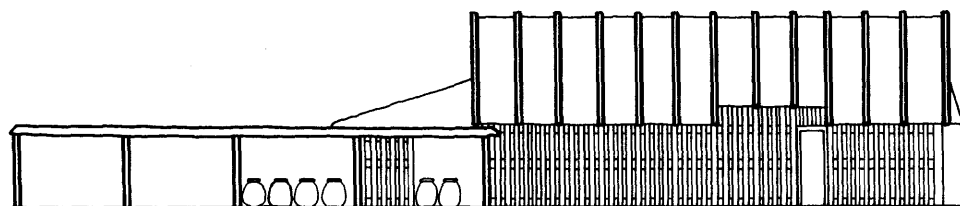
Streets/Walkways	7 %
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	93 %



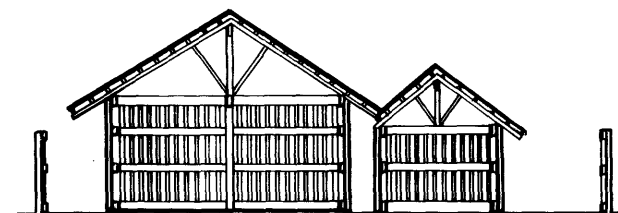
DENSITY

Persons/Hectare	140
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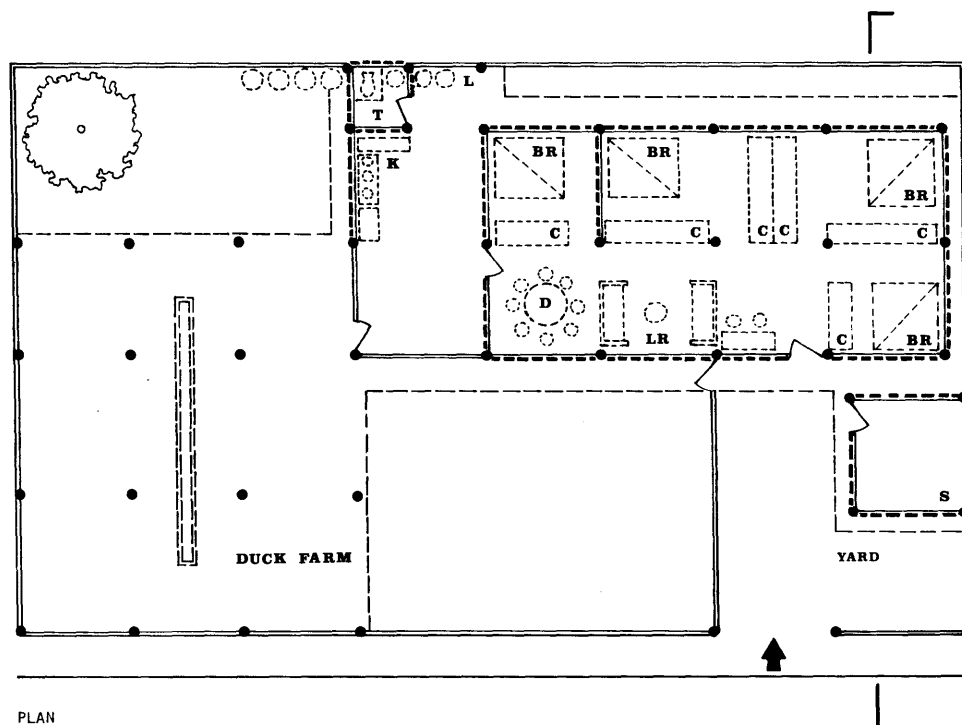
● 20 Persons



ELEVATION



SECTION



PLAN

TYPICAL DWELLING

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: HOUSE
area (sq m): 72
tenure: LEGAL OWNERSHIP

LAND/LOT
utilization: PRIVATE
area (sq m): 375
tenure: LEGAL OWNERSHIP

DWELLING
location: PERIPHERY
type: DETACHED
number of floors: 1
utilization: MULTIPLE
physical state: BAD

DWELLING DEVELOPMENT
mode: INCREMENTAL
developer: PRIVATE
builder: SELF-HELP
construction type: WATTLE/WOOD
year of construction: 1940

MATERIALS
foundation: WOOD
floors: WOOD
walls: BAMBOO/COCONUT LEAVES
roof: BAMBOO/COCONUT LEAVES

DWELLING FACILITIES
wc: 1
shower: 1
kitchen: 5
rooms: 5
other: DUCK FARM

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: THAI/CHINESE
place of birth: CHONBURI
education level: GRADE 4

NUMBER OF USERS
married: 3
single: -
children: 3
total: 6

MIGRATION PATTERN
number of moves: 1
rural - urban: 1973
urban - urban: -
urban - rural: -
why came to urban area: EMPLOYMENT

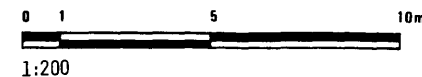
GENERAL: ECONOMIC
user's income group: LOW
employment: OWN BUSINESS
distance to work: -
mode of travel: -

COSTS
dwelling unit: \$250
land - market value: \$250,000

DWELLING UNIT PAYMENTS
financing: SELF-FINANCED
rent/mortgage: -
% income for rent/mortgage: -

KEY

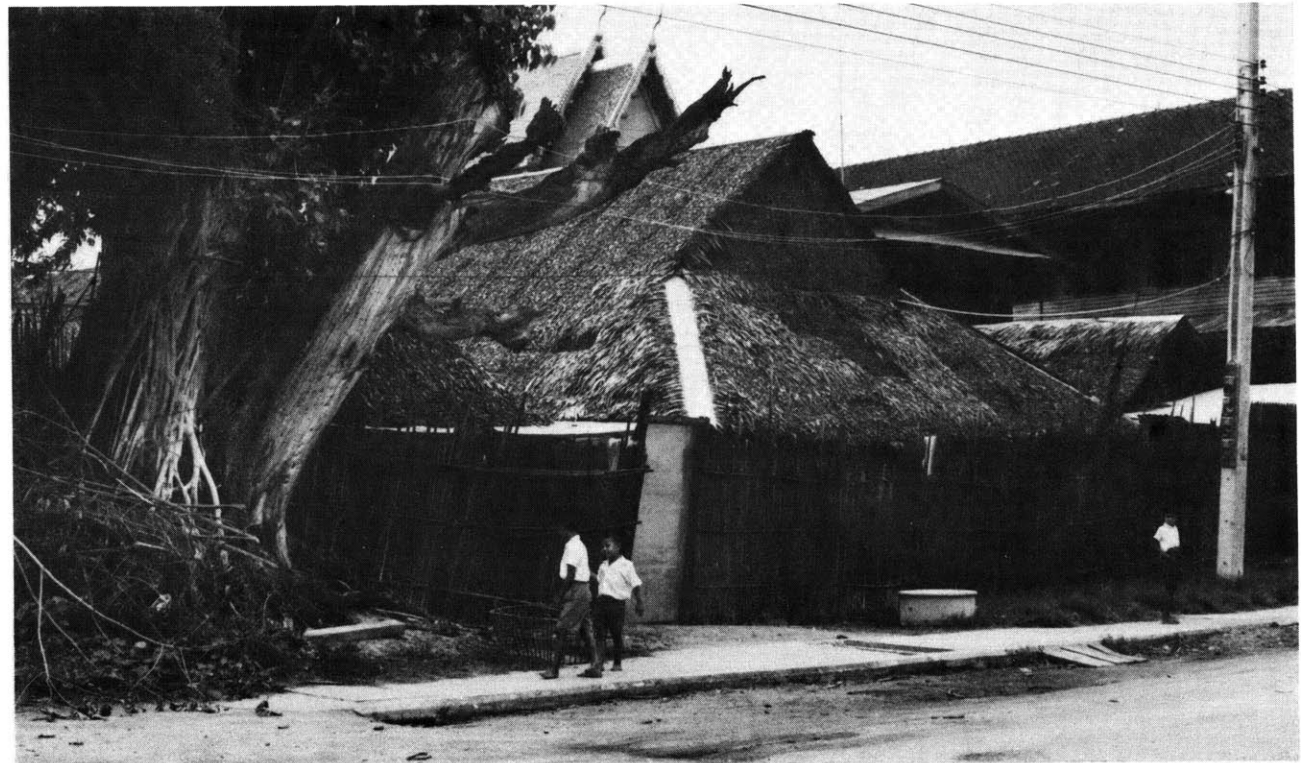
LR Living Room
D Dining/Eating Area
BR Bedroom
K Kitchen/Cooking Area
T Toilet/Bathroom
L Laundry
C Closet
S Storage



BANG SAI, Chonburi: (top left) A view of duck farm yard which is adjacent to the dwelling unit. (1975)

(top right) A farm house with cane wattle fence and coconut-leaves roof covering. (1975)

(bottom) A view of a farm house where a primary school is seen at the side and a temple at the back. (1975)



LOCALITY SOURCES:

Plan: (approximate) Air Photographs,
The Royal Thai Survey Department,
1974.

Land Use Pattern: (tentative) IBID.

Circulation Pattern: (tentative) IBID.

Segment Plan: (approximate) IBID.

Block Plan: (approximate) IBID.

Block Land Utilization: (tentative) IBID.

Typical Dwelling: (approximate) Field Survey,
Kobchai Ocharoen, 1975.

Physical Data: (approximate) IBID.

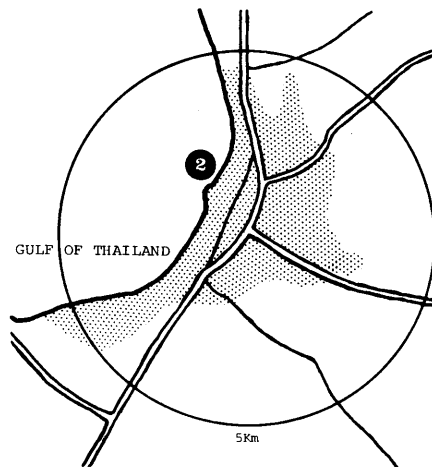
Socio-Economic Data: (approximate) IBID.

Photographs: Kobchai Ocharoen, 1975,
The Royal Thai Survey Department,
1974 (air photographs).

General Information: Chonburi Municipal Office,
Ministry of Interior.

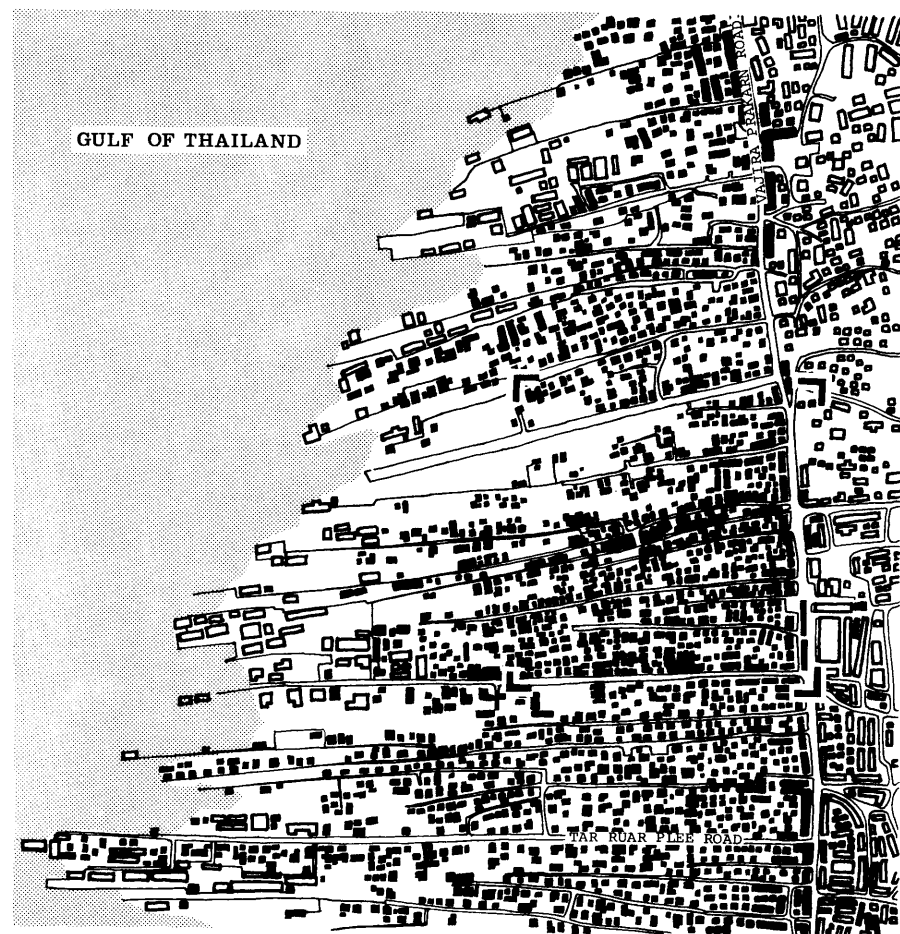
2 BAN KHOT Chonburi

PRIVATE, LOW INCOME, DETACHED/ROW-HOUSES



LOCATION: The locality is situated at the inner ring of Chonburi Municipal City, bounded to the north by the duck-farm community, Bang Sai, to the east by Vajira Prakarn Road, to the south by Tar Ruar Plee Road, and to the west by Gulf of Thailand. The locality is built on the swamp area along the seashore.

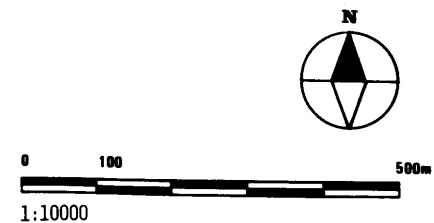
ORIGINS: The locality was established about 40 years ago. It was once entirely the community of fishermen, but now it is a squatter community consisting of mixed category of labor.

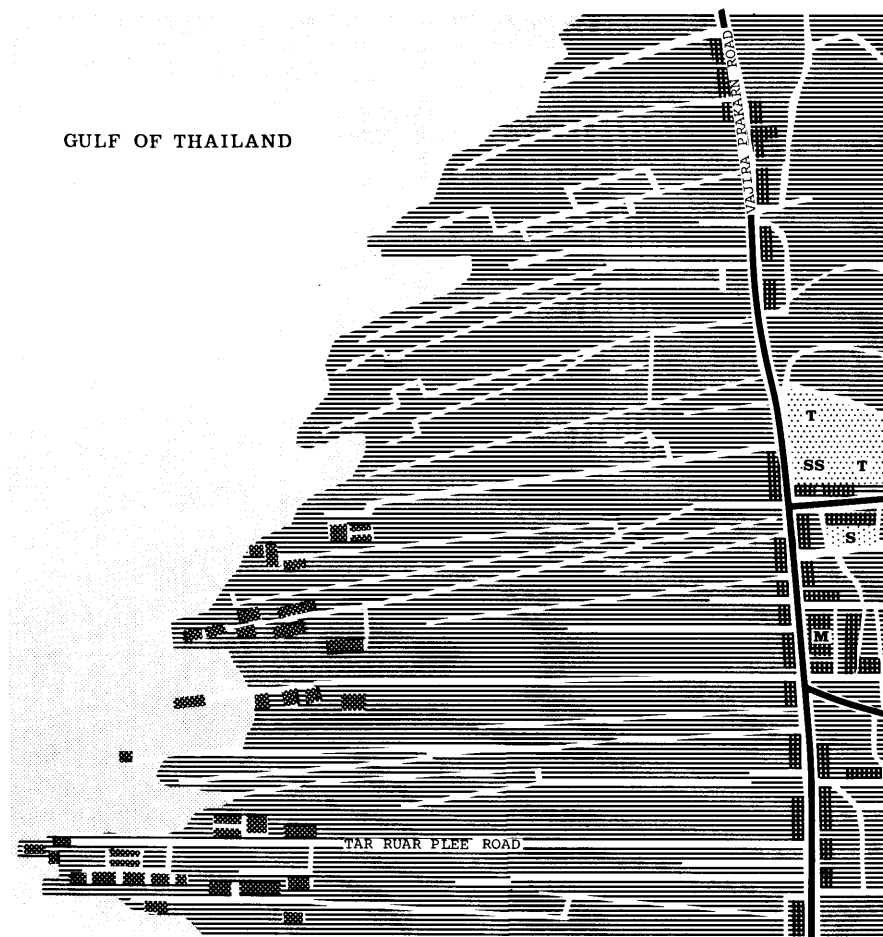


LOCALITY PLAN

□ □ SELECTED
□ □ SEGMENT

LAYOUT: The layout of the community shows an accretive unplanned development from Vajira Prakarn Road into the swamp areas along the seashore and even extended into the Gulf of Thailand.





LOCALITY LAND USE PATTERN

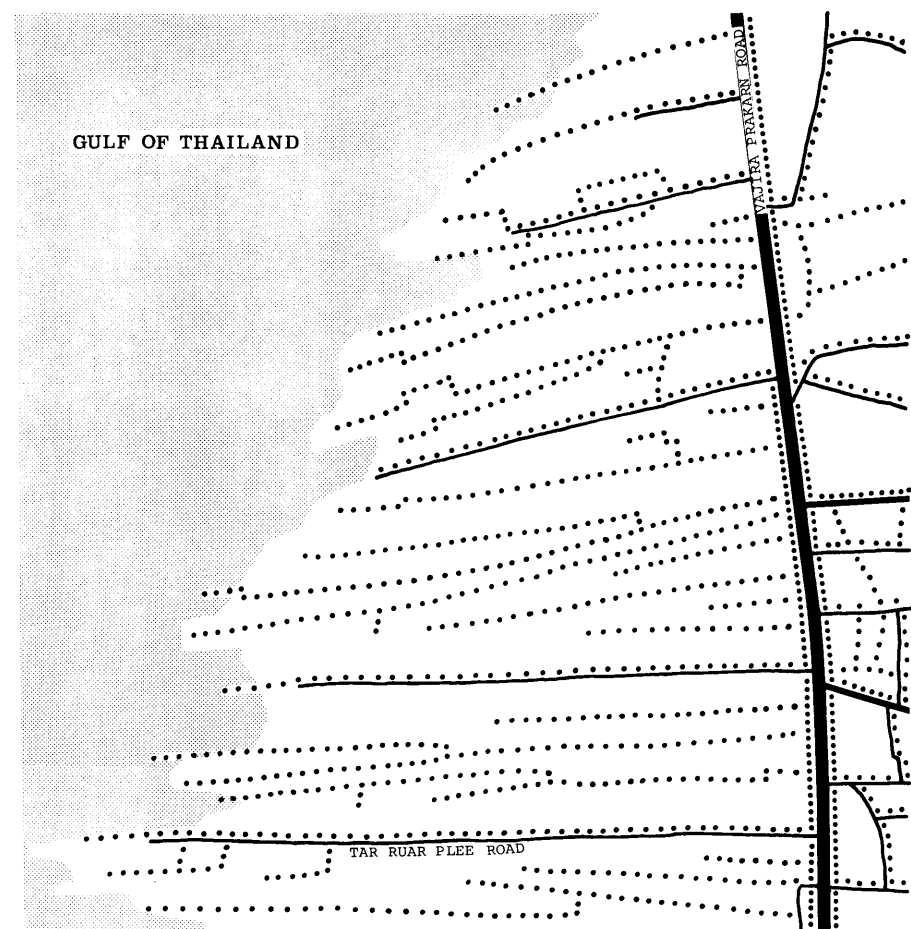
AREAS

	RESIDENTIAL
	COMMERCIAL
	INDUSTRIAL
	OPEN SPACES

KEY

T	Temple
S	School
M	Market
SS	Social Services
	Bus

LAND USE: The commercial shops occur along Vajira Prakarn Road which acts as an entrance point to the community. High density residential area can be found throughout the community. Light industries; fish-sauce factory, can be found along the edge of the extended areas into the sea.

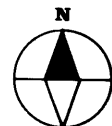


LOCALITY CIRCULATION PATTERN

KEY

	VEHICULAR
	PEDESTRIAN

CIRCULATION: The Vajira Prakarn Road serves as the only main vehicle circulation route of the entire community. Other pedestrian roads, mostly unpaved, are built/extended into the sea. The longest extended road is Tar Ruar Plee, approximately 1 km., which is the location of several fish-sauce factories and also an important port of Chonburi.



1:10000

POPULATION: In 1975, there were 1,421 households with the total population of 8,320, of which 4,208 are male and 4,112 are female. The family structure is predominantly nuclear. Over 50% of the population is under 20 years old.

INCOME: The majority of people in the locality are low/moderately low, consisting of several categories of labor, the occupation ranges from fishermen to clerical worker. No income distribution data is available, but the annual income can be estimated at about \$250-\$650.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITIES	Total Number	Area Hectare	Density N/Ha
LOTS	670	15	44
DWELLING UNITS	930	15	62
PEOPLE	4,650	15	310

AREAS	Hectares	Percentage
PUBLIC (streets, walkways, open spaces)	1.3	8.7
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	13.7	91.3
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	15	100
WATER	1	-

400m

300m

200m

100m

0m



LOCALITY SEGMENT AIR PHOTOGRAPH

0 50 100 150m
1:2500





400m

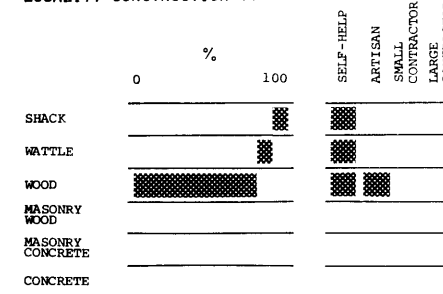
300m

200m

100m

0m

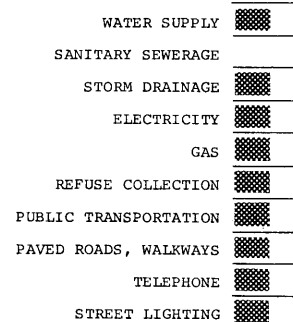
LOCALITY CONSTRUCTION TYPES



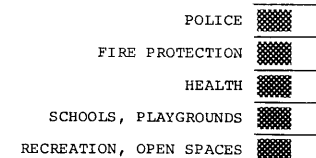
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

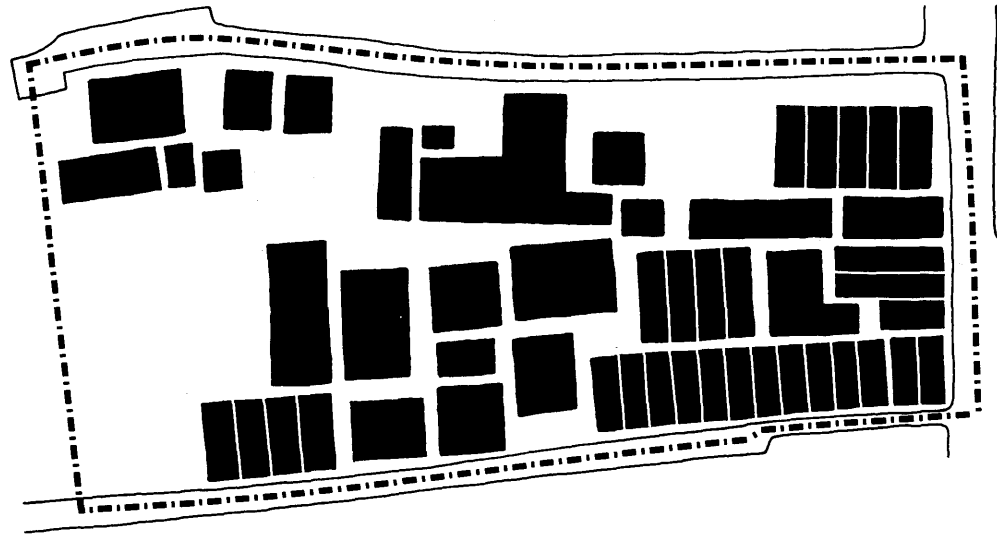
Quality of information: Approximate

SELECTED BLOCK

LOCALITY SEGMENT PLAN

0 50 100 150m
1:2500





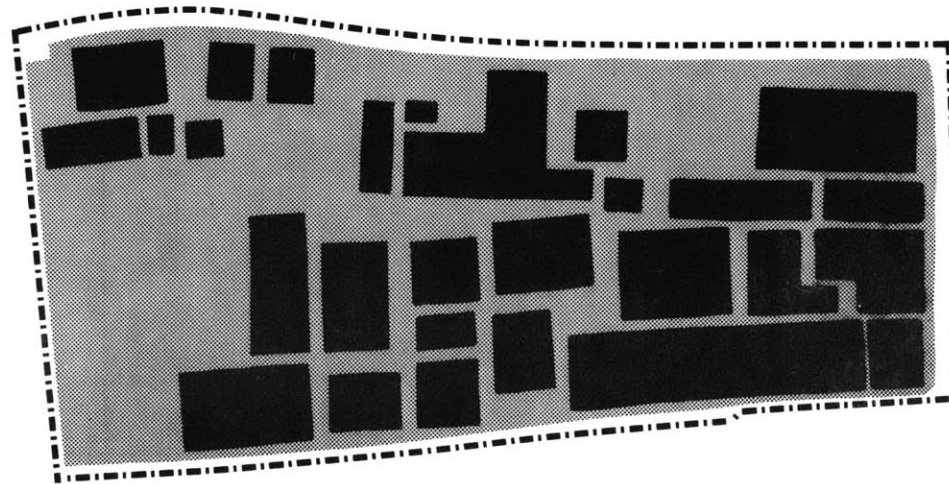
LOCALITY BLOCK PLAN



LOCALITY BLOCK LAND UTILIZATION DATA

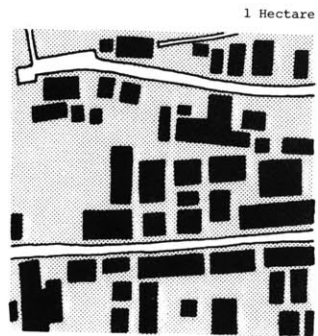
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	28	0.64	44
DWELLING UNITS	50	0.64	70
PEOPLE	250	0.64	390

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.06	9.5
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.28	43.6
SEMI-PRIVATE (cluster courts)	0.3	46.9
TOTAL	0.64	100

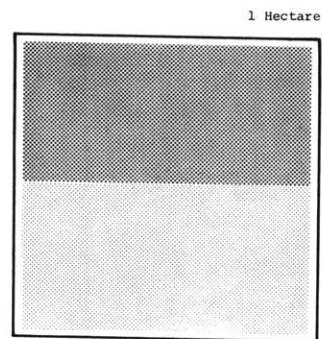


LOCALITY BLOCK LAND UTILIZATION

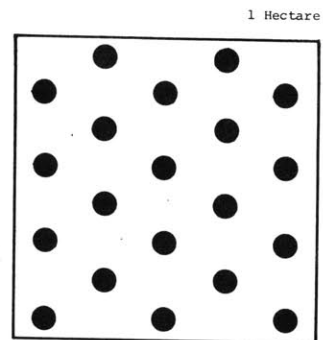
LAND UTILIZATION DIAGRAMS



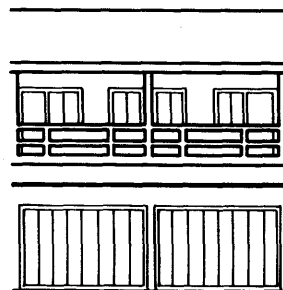
PATTERN	
Public:	streets/walkways
Semi-Public:	playgrounds
Semi-Private:	cluster courts
Private:	lots
	dwelling



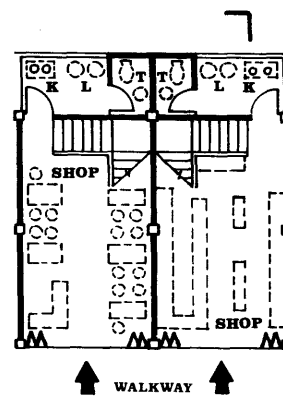
PERCENTAGES	
Streets/Walkways	9.5%
Playgrounds	-
Cluster Courts	46.9%
Dwellings/Lots	43.6%



DENSITY	
Persons/Hectare	390
●	20 Persons



ELEVATION

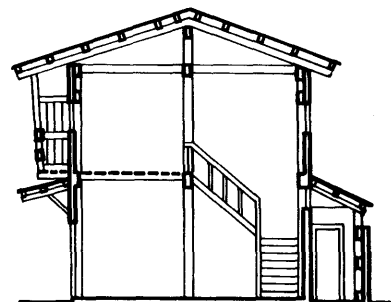


FIRST FLOOR PLAN

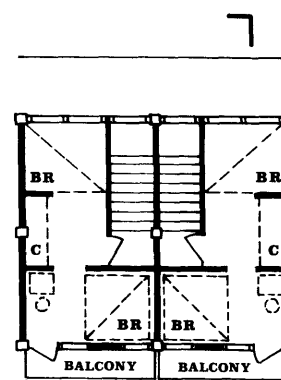
KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet

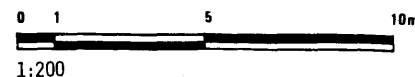
TYPICAL DWELLING



SECTION



SECOND FLOOR PLAN



PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: HOUSE
area (sq m): 28
tenure: LEGAL OWNERSHIP

LAND/LOT
utilization: PRIVATE
area (sq m): 28
tenure: LEGAL RENTAL

DWELLING
location: INNER RING
type: ROW-HOUSE
number of floors: 2
utilization: MULTIPLE
physical state: BAD

DWELLING DEVELOPMENT
mode: INSTANT
developer: PRIVATE
builder: SMALL CONTRACTOR
construction type: WOOD
year of construction: 1944

MATERIALS
foundation: WOOD
floors: WOOD
walls: WOOD
roof: GALVANIZED STEEL

DWELLING FACILITIES
wc: 1
shower: -
kitchen: 1
rooms: 5
other: -

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: THAI
place of birth: CHONBURI
education level: GRADE 4

NUMBER OF USERS
married: 3
single: -
children: 3
total: 6

MIGRATION PATTERN
number of moves: -
rural - urban: -
urban - urban: -
urban - rural: -
why came to urban area: -

GENERAL: ECONOMIC
user's income group: LOW
employment: OWN BUSINESS
distance to work: -
mode of travel: -

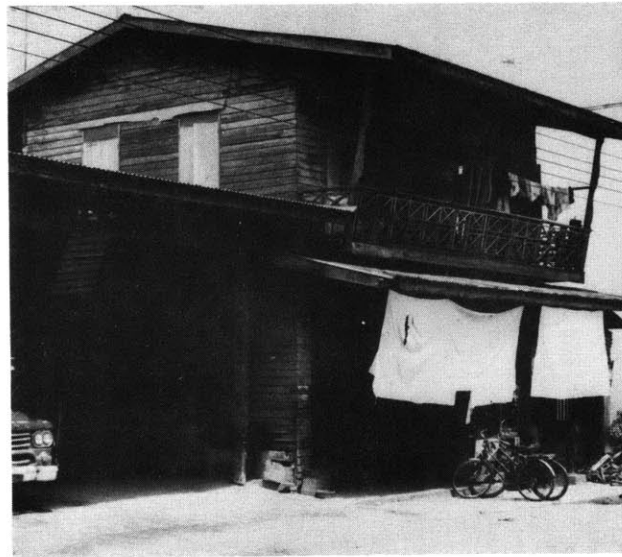
COSTS
dwelling unit: \$ 550
land - market value: \$ 300,000

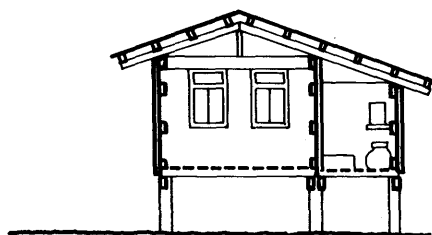
DWELLING UNIT PAYMENTS
financing: SELF-FINANCE
rent/mortgage: \$ 7
% income for rent/mortgage: 17 %

BAN KHOT, Chonburi: (top left) Wooden semi-detached houses with a garage at the side. The second floor balcony is used for drying clothes. Hanging cloth in front of the houses are used as sunshade. (1975)

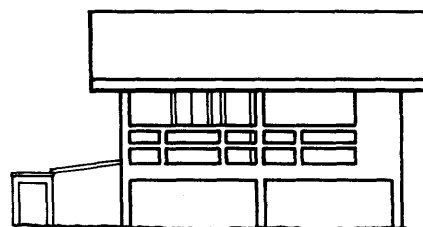
(top right) Garbage baskets are placed along the curbs. (1975)

(bottom) View from Vajira Prakarn Road. (1975)

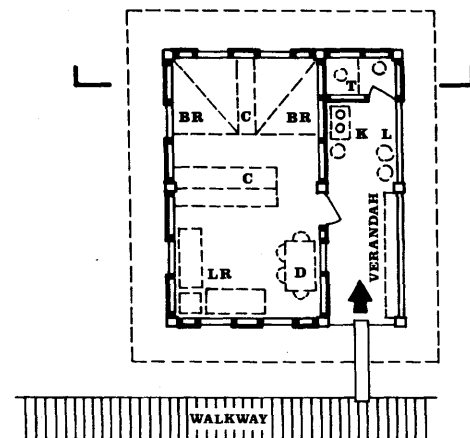




SECTION



ELEVATION

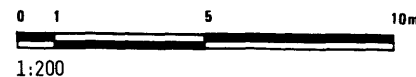


PLAN

TYPICAL DWELLING

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet



PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: HOUSE
area (sq m): 42
tenure: LEGAL OWNERSHIP

LAND/LOT
utilization: PRIVATE
area (sq m): 42
tenure: LEGAL RENTAL

DWELLING
location: INNER RING
type: DETACHED
number of floors: 1
utilization: FAMILY
physical state: BAD

DWELLING DEVELOPMENT
mode: INCREMENTAL
developer: PRIVATE
builder: ARTISAN
construction type: WOOD
year of construction: 1948

MATERIALS
foundation: WOOD
floors: WOOD
walls: WOOD
roof: GALVANIZED STEEL

DWELLING FACILITIES
wc: 1
shower: -
kitchen: 1
rooms: 2
other: VERANDAH

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: THAI
place of birth: CHONBURI
education level: GRADE 4

NUMBER OF USERS
married: 2
single: -
children: 2
total: 4

MIGRATION PATTERN
number of moves: -
rural - urban: -
urban - urban: -
urban - rural: -
why came to urban area: -

GENERAL: ECONOMIC
user's income group: LOW
employment: FISHERMAN
distance to work: 1 km.
mode of travel: WALKING

COSTS
dwelling unit: \$300
land - market value: \$120,000

DWELLING UNIT PAYMENTS
financing: SELF-FINANCED
rent/mortgage: \$3
% income for rent/mortgage: 13 %

BAN KHOT, Chonburi: (top) A general air view. (1975)

(bottom left) Cat-walks, serve as pedestrian walkways for the community. (1975)

(bottom right) Dwellings, cat-walks, electricity poles, water pipe lines and "pollution" are extended into the sea. (1975)



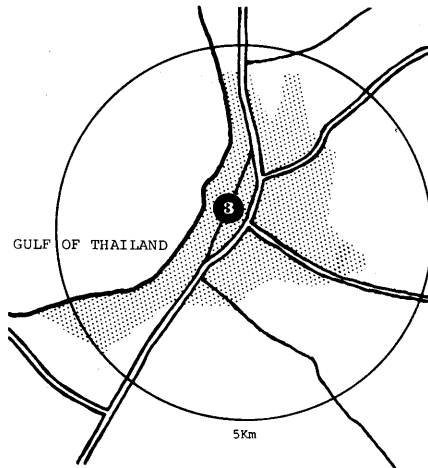
LOCALITY SOURCES:

Plan: (approximate) Air Photographs,
The Royal Thai Survey Department,
1974.
Land Use Pattern: (tentative) IBID.
Circulation Pattern: (tentative) IBID.
Segment Plan: (approximate) IBID.
Block Plan: (approximate) IBID.
Block Land Utilization: (tentative) IBID.
Typical Dwelling: (approximate) Field Survey,
Kobchai Ocharoen, 1975.
Physical Data: (approximate) IBID.
Socio-Economic Data: (approximate) IBID.
Photographs: Kobchai Ocharoen, 1975,
The Royal Thai Survey Department,
1974 (air photographs).
Chonburi Municipal Office,
Ministry of Interior.

3 MAKARM YONG

Chonburi

PRIVATE, MIDDLE/HIGH INCOME, ROW-HOUSES



LOCATION: The locality is situated at the city center of Chonburi, bounded to the north by Thai Pracha Road and Surachai Road, to the east by Sukhumvit Highway, to the south by Akhaniwat Road, and to the west by Vajira-Prakarn Road and the squatter community, Ban Khot. The locality is the central business district of the City.

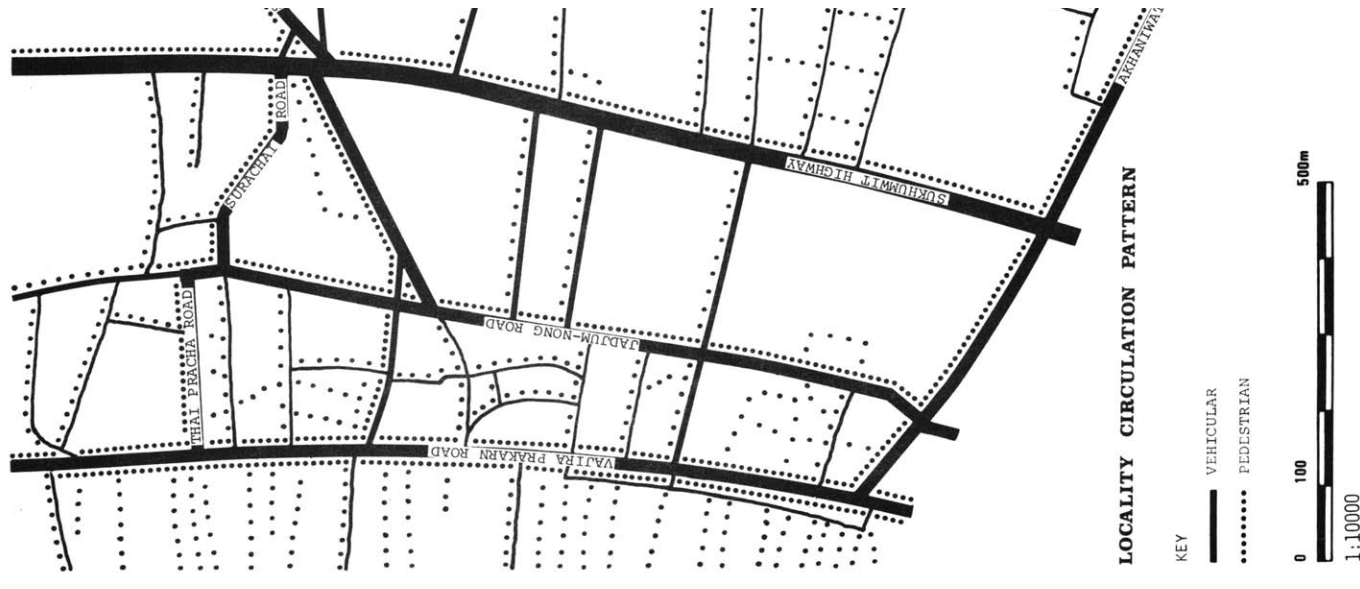
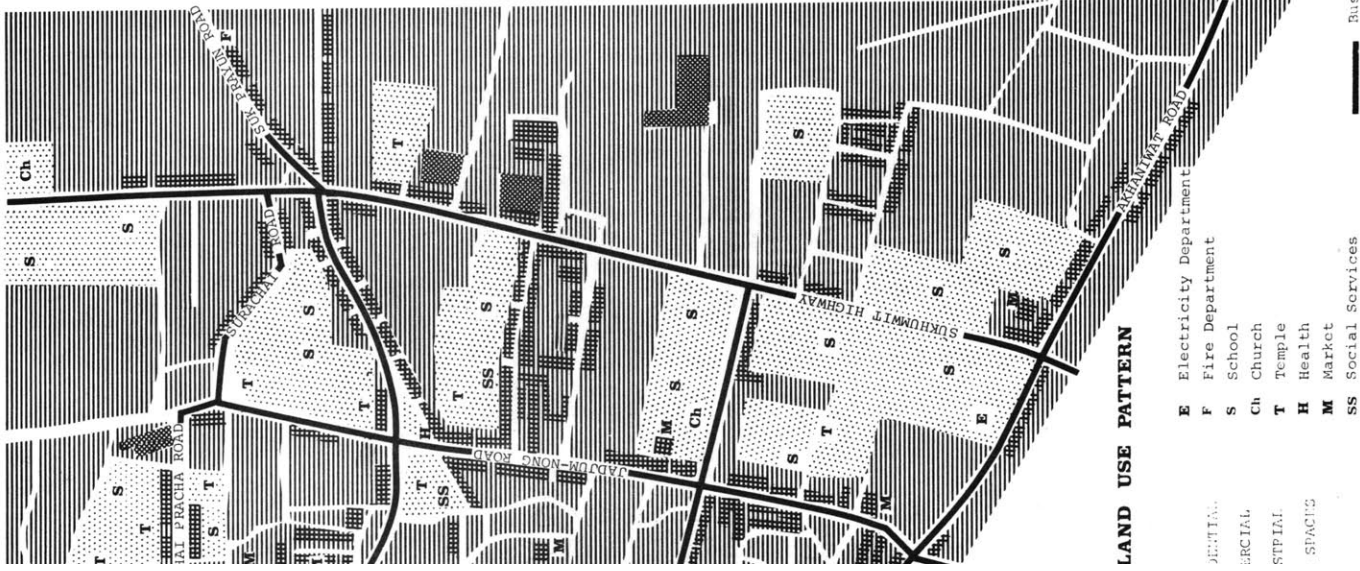
ORIGINS: The locality was established about 50 years ago, the potential for business had been developed since then. The community was once concentrated only between Vajira Prakarn Road and Jadjum-Nong Road, and later extended towards the by-pass Sukhumvit Highway, connected to Bangkok.

LAYOUT: The layout of the community clearly shows the growth that had been extended from the high density areas within the city center towards the by-pass Sukhumvit Highway, this makes the Highway no more a by-pass.

LAND USE: The commercial row-houses are found along the major streets, while the residential areas are dispersed in the inner parts. A large portion of land has been taken place by public/semi-public uses. Schools, temples and churches can be found throughout the locality. The location and number of temples in the plan reflect the strong religious tradition of people in the City.

CIRCULATION: Pedestrian and vehicles are mixed in the public streets. Traffic congestion occurs along the main streets in the city center, Vajira Prakarn Road and Jadjum-Nong Road, due to the narrow width of the streets which were not original planned to serve the today heavy traffic. Sukhumvit Highway serves as the connecting route to nearby districts and Bangkok.





POPULATION: In 1975, there were 2,706 households with the total population of 11,680, of which 5,410 are male and 6,270 are female. The majority of households consist of extended families. Over 50% of the population is under 20 years old.

INCOME: The majority of people are middle/high income, consisting of several kinds of commercial business. The annual income can be estimated to be ranging from \$1,000-\$3,000.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITY	Total Number	Area Hectare	Density N/Ha
LOTS	495	16	31
DWELLING UNITS	1,280	16	80
PEOPLE	6,400	16	400

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	1.5	9.4
SEMI-PUBLIC (open spaces, schools, community centers)	5.3	33.1
PRIVATE (dwellings, shops, factories, lots)	9.2	57.5
SEMI-PRIVATE (cluster courts) -	-	-
TOTAL 16	100	

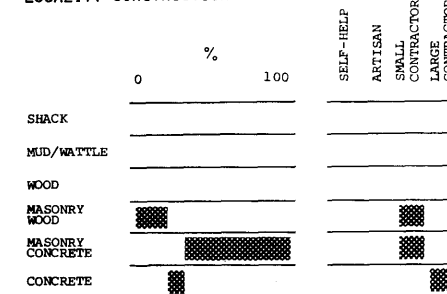


LOCALITY SEGMENT AIR PHOTOGRAPH





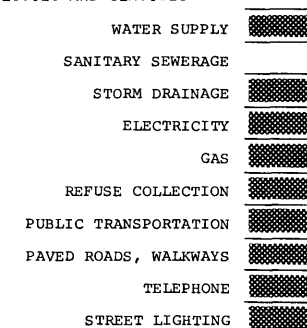
LOCALITY CONSTRUCTION TYPES



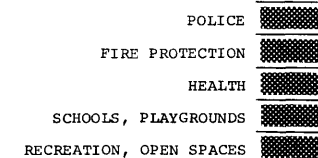
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

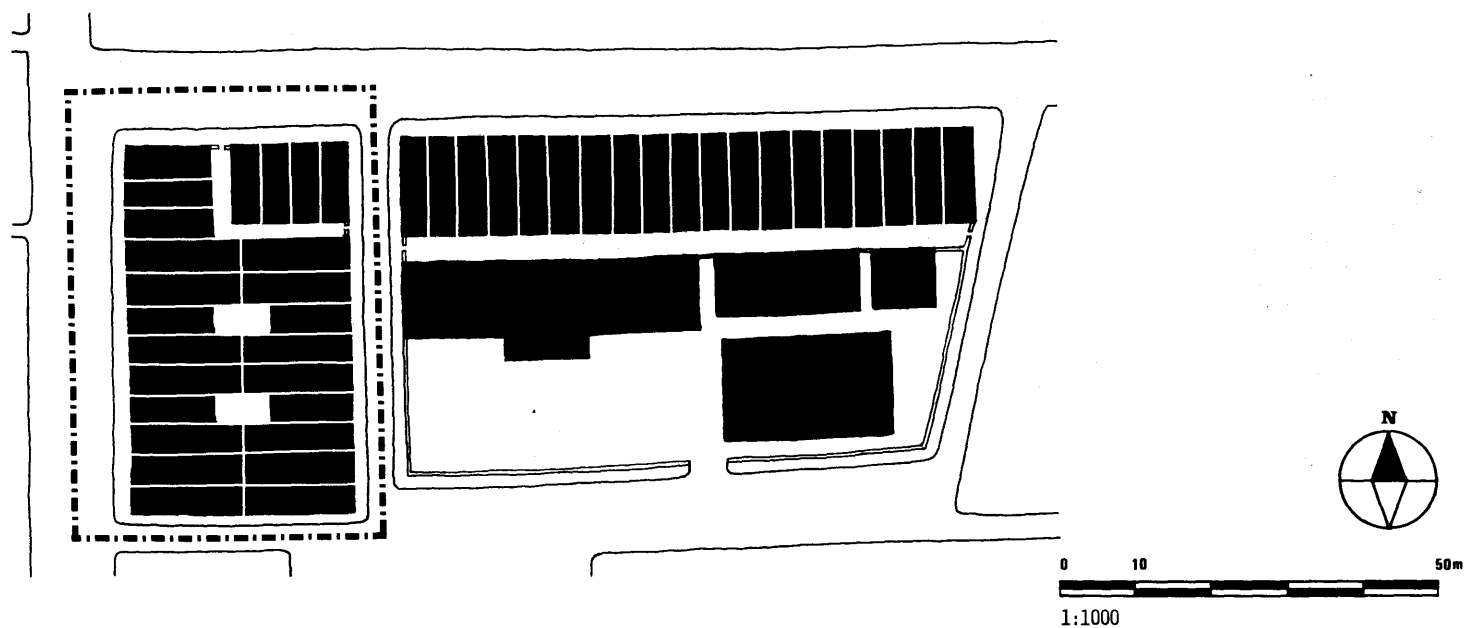
Quality of information: Approximate

[] SELECTED
[] BLOCK

LOCALITY SEGMENT PLAN

0 50 100 150m
1:2500

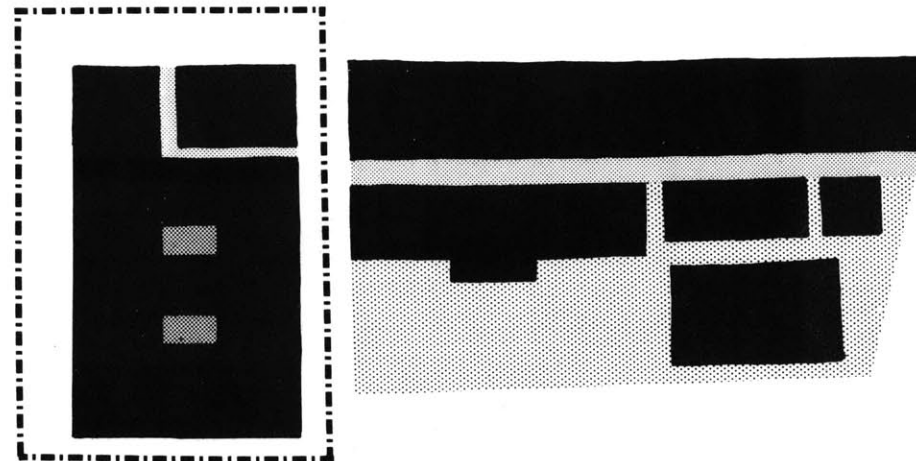




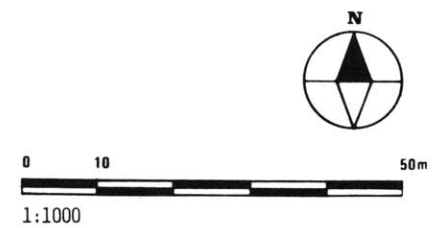
LOCALITY BLOCK PLAN

LOCALITY BLOCK LAND UTILIZATION DATA

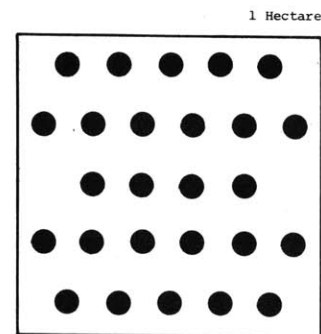
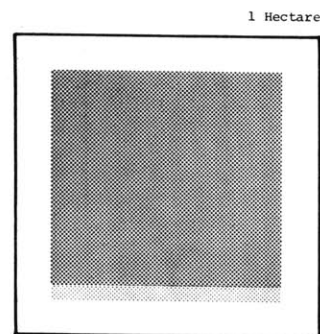
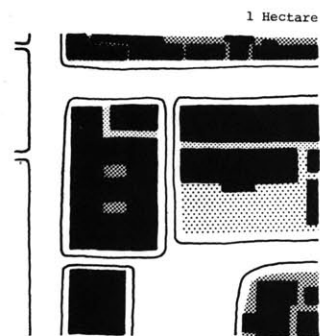
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	1	0.24	4
DWELLING UNITS	25	0.24	104
PEOPLE	125	0.24	520
AREAS		Hectares	Percentages
PUBLIC (streets, walkways, open spaces)		0.096	40
SEMI-PUBLIC (open spaces, schools, community centers)		-	-
PRIVATE (dwellings, shops, factories, lots)		0.136	56.6
SEMI-PRIVATE (cluster courts)		0.008	3.4
TOTAL		0.24	100



LOCALITY BLOCK LAND UTILIZATION (ONLY BLOCK ON LEFT IS CONSIDERED)



LAND UTILIZATION DIAGRAMS



PATTERN

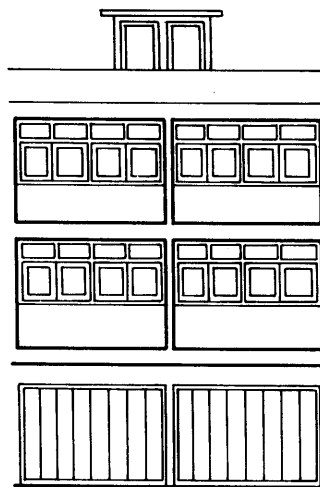
Public:	streets/walkways	
Semi-Public:	playgrounds	
Semi-Private:	cluster courts	
Private:	lots	
	dwellings	

PERCENTAGES

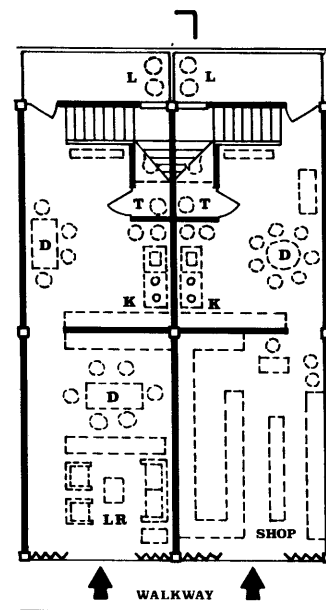
Streets/Walkways	40 %
Playgrounds	-
Cluster Courts	3.4%
Dwellings/Lots	56.6%

DENSITY

Persons/Hectare	520
● 20 Persons	



ELEVATION

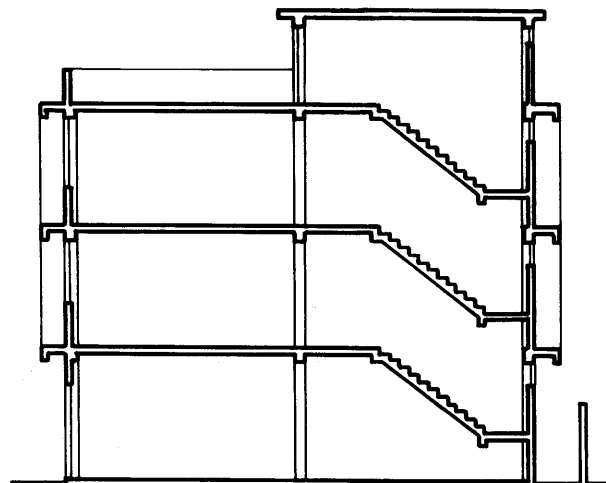


FIRST FLOOR PLAN

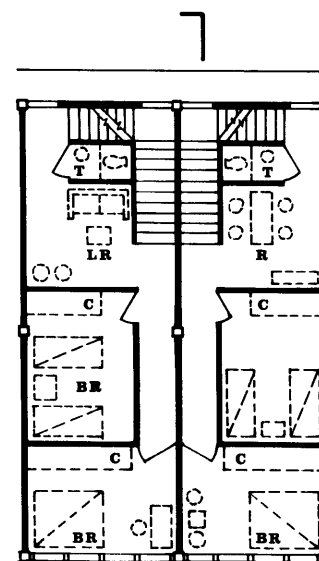
TYPICAL DWELLING

KEY

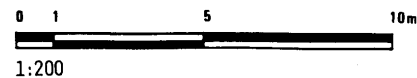
- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



SECTION



SECOND FLOOR PLAN

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
 type: HOUSE
 area (sq m): 48
 tenure: LEGAL RENTAL

LAND/LOT
 utilization: PRIVATE
 area (sq m): 54
 tenure: LEGAL RENTAL

DWELLING
 location: CITY CENTER
 type: ROW-HOUSE
 number of floors: 3
 utilization: MULTIPLE
 physical state: GOOD

DWELLING DEVELOPMENT
 mode: INSTANT
 developer: PRIVATE
 builder: SMALL CONTRACTOR
 construction type: MASONRY-CONCRETE
 year of construction: 1958

MATERIALS
 foundation: CONCRETE
 floors: CONCRETE
 walls: MASONRY
 roof: CONCRETE

DWELLING FACILITIES

wc: 1
 shower: 1
 kitchen: 1
 rooms: 8
 other: -

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
 user's ethnic origin: CHINESE
 place of birth: CHONBURI
 education level: GRADE 4

NUMBER OF USERS

married: 4
 single: -
 children: 7
 total: 11

MIGRATION PATTERN

number of moves: -
 rural - urban: -
 urban - urban: -
 urban - rural: -
 why came to urban area: -

GENERAL: ECONOMIC

user's income group: HIGH
 employment: OWN BUSINESS
 distance to work: -
 mode of travel: -

COSTS

dwelling unit: \$ 14,500
 land - market value: \$ 500,000

DWELLING UNIT PAYMENTS

financing: SELF-FINANCED
 rent/mortgage: \$ 25
 % income for rent/mortgage: 16 %

MAKARM YONG, Chonburi: (top) A general view of commercial row-houses along Jadjum-nong Road. (1975)

(bottom left) A view of the Crown Property Market on Vajira Prakarn Road. (1975)

(bottom right) Two smiling girls are cleaning fishes in front of the Crown Property Live-fishes Market. (1975)

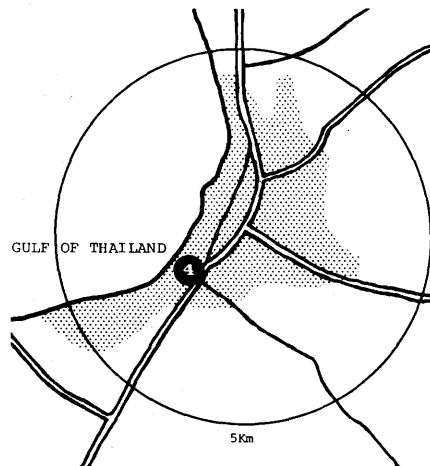


LOCALITY SOURCES:

- Plan: (approximate) Air Photographs, The Royal Thai Survey Department, 1974.
- Land Use Pattern: (tentative) IBID.
- Circulation Pattern: (tentative) IBID.
- Segment Plan: (approximate) IBID.
- Block Plan: (approximate) IBID.
- Block Land Utilization: (tentative) IBID.
- Typical Dwelling: (approximate) Field Survey, Kobchai Ocharoen, 1975.
- Physical Data: (approximate) IBID.
- Socio-Economic Data: (approximate) IBID.
- Photographs: Kobchai Ocharoen, 1975, The Royal Thai Survey Department, 1974 (air photographs).
- General information: Chonburi Municipal Office, Ministry of Interior.

4 BANG PLA SOI Chonburi

PRIVATE, MIDDLE/HIGH INCOME, DETACHED HOUSES

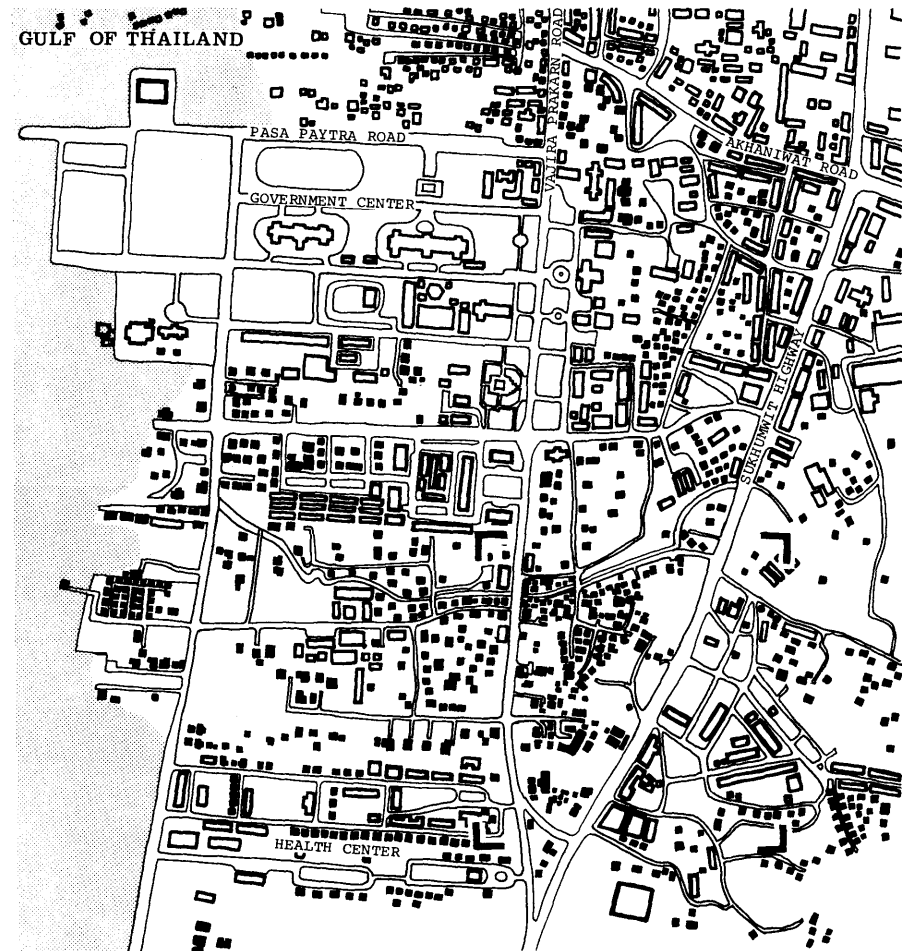


LOCATION: The locality is a district of Government offices, situated at the inner ring of the City, bound to the north by Pasa Paytra Road and Akhaniwat Road, to the east by Sukhumvit Highway, to the south by the Chonburi Health Center, and to the west by Gulf of Thailand.

ORIGINS: The locality was established about 30 years ago, it was initially a residential area for the middle and high income groups. Due to the lack of land for the increasing number of public buildings, several "filling-up" projects had been done on the swamp areas along the seashore, and most of the recent public buildings were constructed on these areas. This makes Chonburi a model city in filling-up and developing the what was once a waste land.

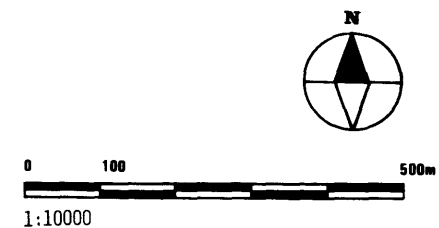
LAYOUT: The locality is a residential area of low density for middle and high income groups in Chonburi, but also predominately a district of all the government offices and public buildings. It is both the center of local and provincial authorities. The Regional Provincial Police Headquarter, the Central Health Training Center, the Telecommunication Center and many other public facility offices are all located here.

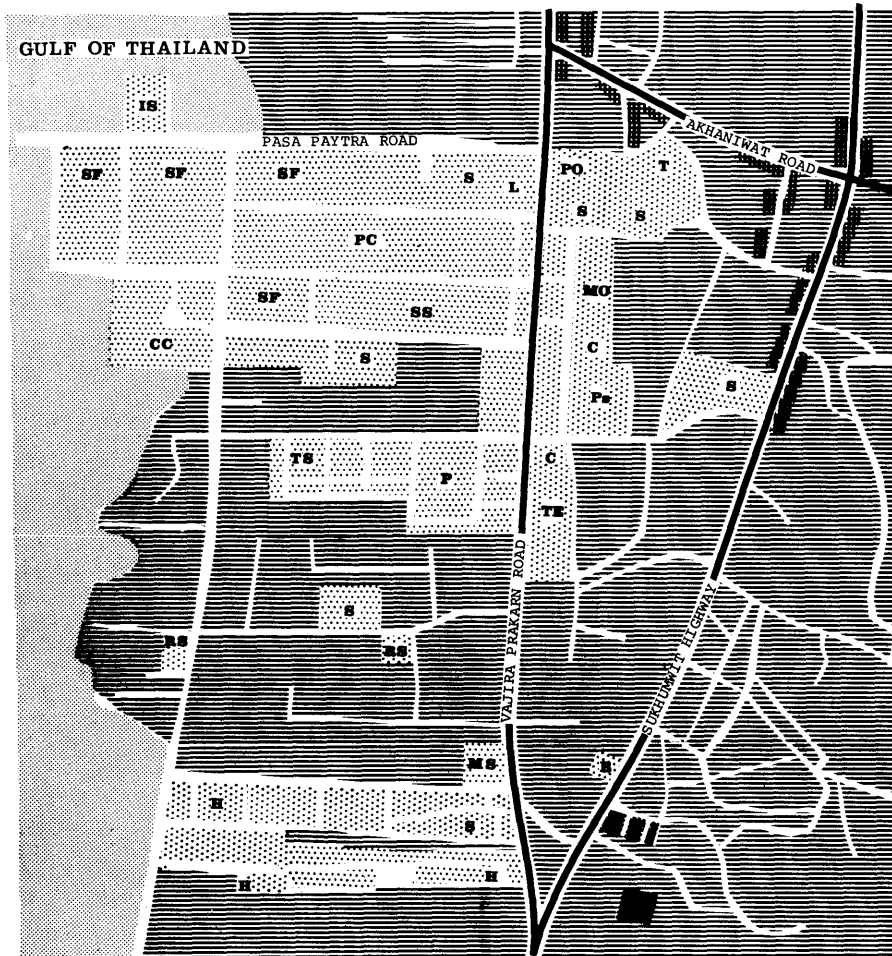
LAND USE: The area is predominately a public use and middle/high income residential area with large size lot and very low density. The extended public area into the swamp areas along the seashore shows the tendency/direction of future growth for the City. An implementation of a New Town for Chonburi has being under construction on a filled-up site, 1 km. to the south of the government district.



LOCALITY PLAN

[] SELECTED
[] SEGMENT





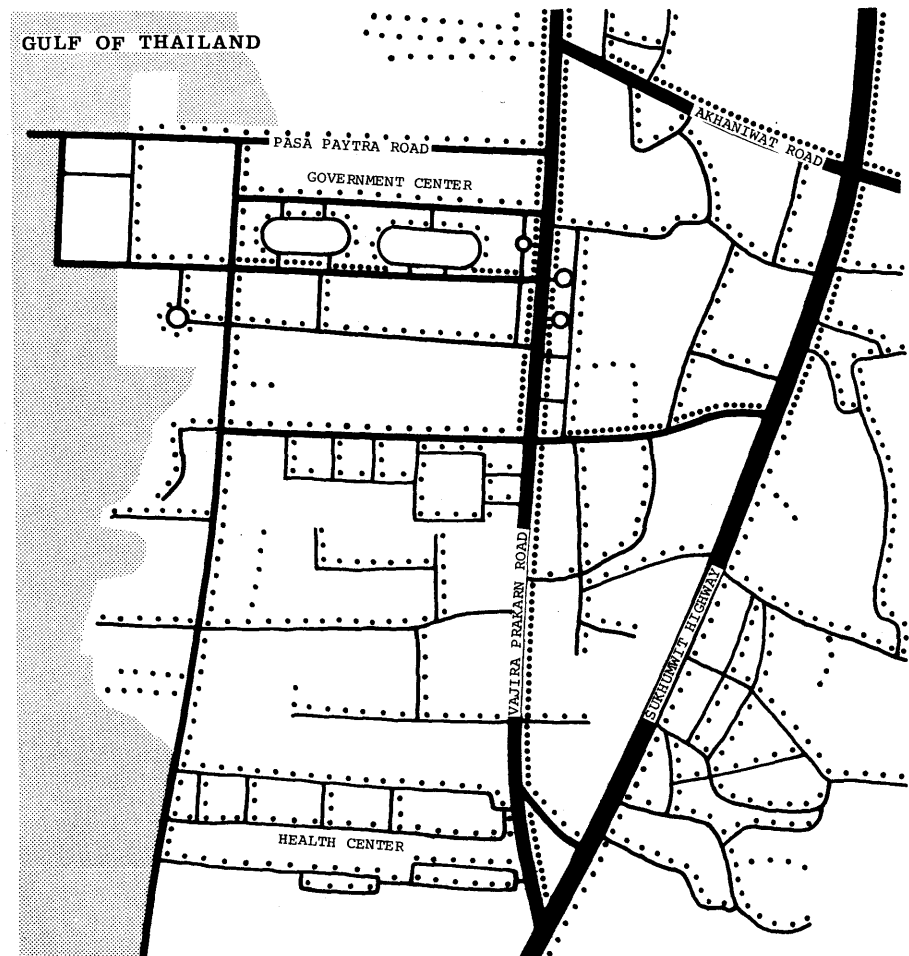
LOCALITY LAND USE PATTERN

AREAS

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- OPEN SPACES

KEY

- | | |
|-----------------------------|-------------------------------------|
| P Police Headquarter | IS Indoor Stadium |
| P. Prison | SF Sport Field |
| S School | SS Social Services |
| T Temple | MS Meteorological Station |
| L Library | RS Radio Station |
| H Health | TS Telecommunication Station |
| MO Municipal Office | TE Telephone Exchange Office |
| CC Civic Center | B Bus Station |
| PC Provincial Center | |
| PO Post Office | |
- Bus



LOCALITY CIRCULATION PATTERN

KEY

- VEHICULAR
- PEDESTRIAN

CIRCULATION: Pedestrian and vehicles are mixed in public streets, of which Vajira Prakarn Road and Sukhumvit Highway are vehicles dominate, and the other roads are pedestrian dominate.



POPULATION: In 1975, there were 4,667 households with the total population of 27,870, of which 15,034 are male and 12,836 are female. The family structure is predominantly nuclear. Over 50% of the population is under 20 years old.

INCOME: The majority of people are middle/high income, consisting of several categories of labor, the occupation ranges from the government worker to clerical worker. No income distribution data is available, but the annual income can be estimated to be ranging from \$1,000 to \$2,500.

LOCALITY SEGMENT LAND UTILIZATION DATA

DENSITY	Total Number	Area Hectare	Density N/Ha
LOTS	185	16	12
DWELLING UNITS	253	16	16
PEOPLE	1,265	16	79

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	2.8	17.5
SEMI-PUBLIC (open spaces, schools, community centers)	2.4	15
PRIVATE (dwellings, shops, factories, lots)	10.8	67.5
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	16	100

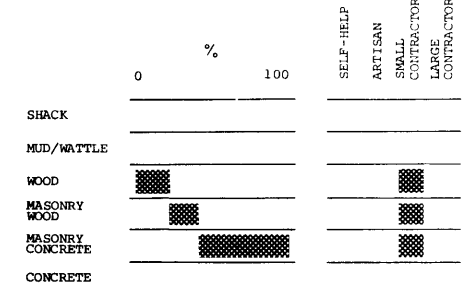


LOCALITY SEGMENT AIR PHOTOGRAPH

0 50 100 150m
1:2500



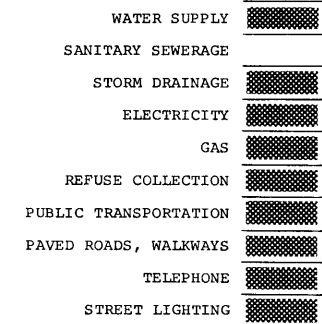
LOCALITY CONSTRUCTION TYPES



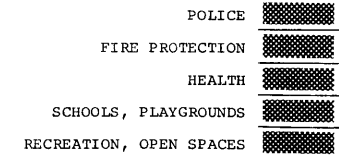
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES



LOCALITY COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

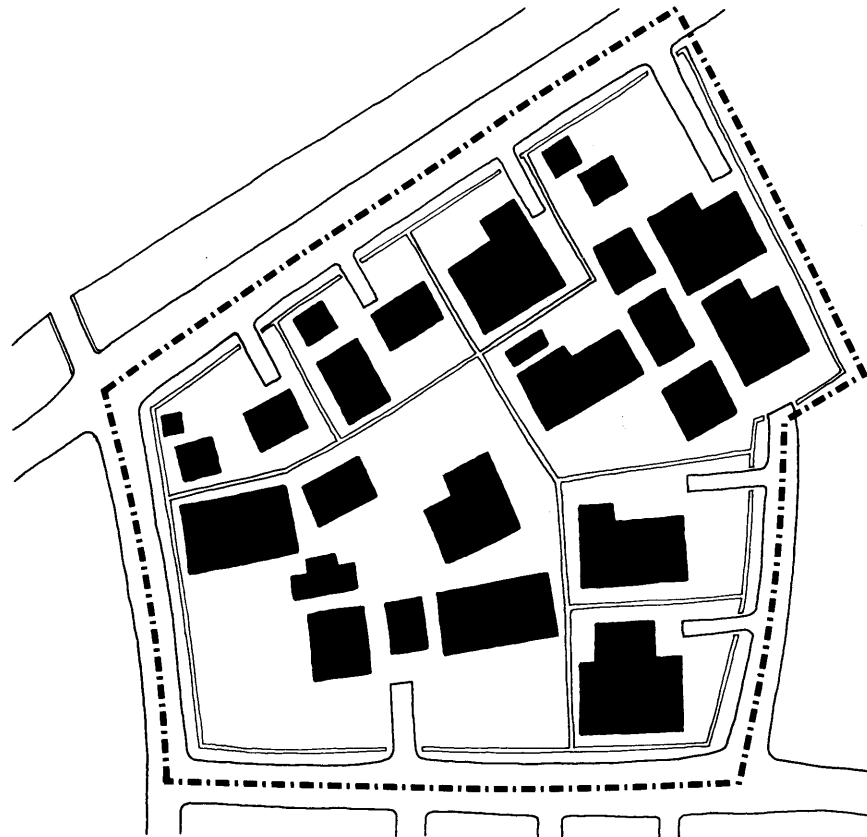
Quality of information: Approximate

SELECTED BLOCK

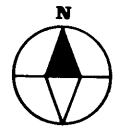


LOCALITY SEGMENT PLAN

0 50 100 150m
1:2500



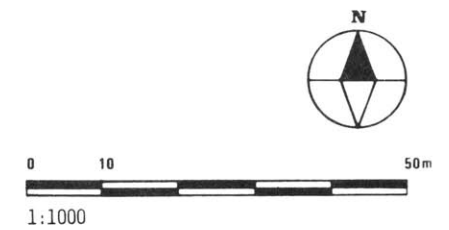
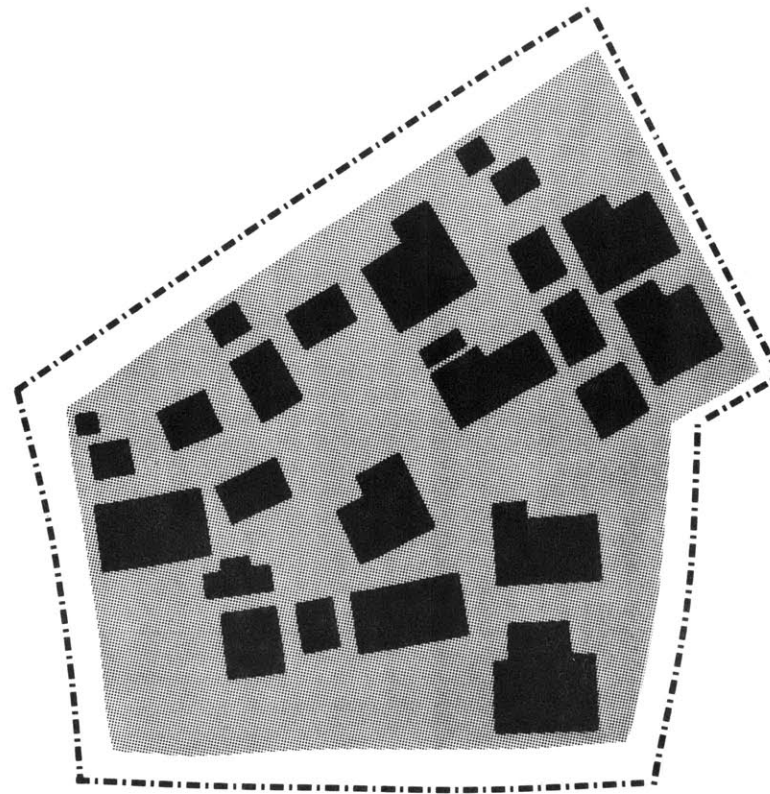
LOCALITY BLOCK PLAN



LOCALITY BLOCK LAND UTILIZATION DATA

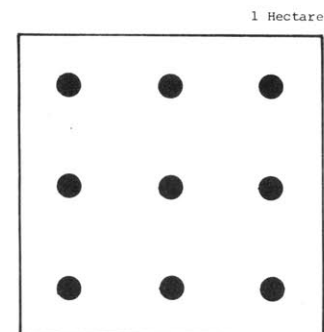
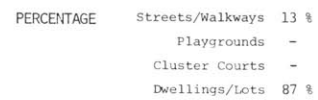
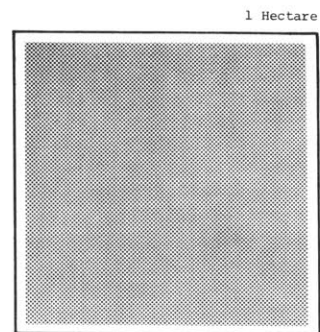
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	7	0.62	11
DWELLING UNITS	23	0.62	40
PEOPLE	115	0.62	185

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.08	13
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.54	87
SEMI-PRIVATE (cluster courts)	-	-
TOTAL	0.62	100



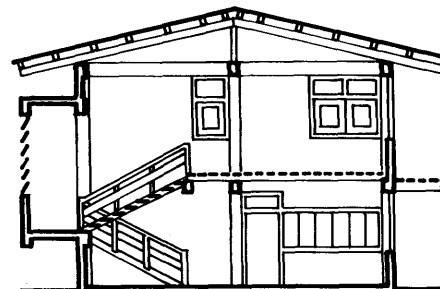
LOCALITY BLOCK LAND UTILIZATION

LAND UTILIZATION DIAGRAMS

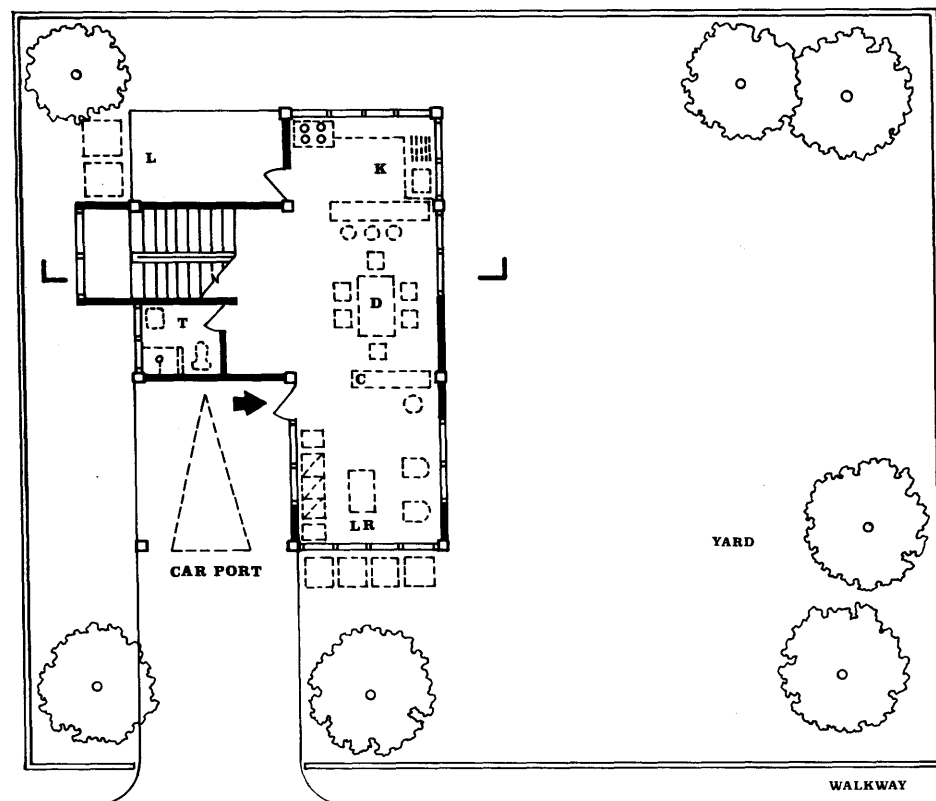




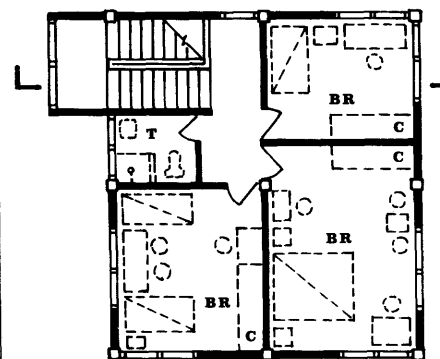
ELEVATION



SECTION



FIRST FLOOR PLAN



SECOND FLOOR PLAN

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage

PHYSICAL DATA
(related to dwelling and land)

DWELLING UNIT
type: HOUSE
area (sq m): 75
tenure: LEGAL OWNERSHIP

LAND/LOT
utilization: PRIVATE
area (sq m): 480
tenure: LEGAL OWNERSHIP

DWELLING
location: INNER RING
type: DETACHED
number of floors: 2
utilization: FAMILY
physical state: GOOD

DWELLING DEVELOPMENT
mode: INSTANT
developer: PRIVATE
builder: SMALL CONTRACTOR
construction type: MASONRY-CONCRETE
year of construction: 1965

MATERIALS
foundation: CONCRETE
floors: CONCRETE/WOOD
walls: MASONRY
roof: ASBESTOS TILE

DWELLING FACILITIES
wc: 2
shower: 2
kitchen: 1
rooms: 5
other: CAR PORT

SOCIO-ECONOMIC DATA
(related to user)

GENERAL: SOCIAL
user's ethnic origin: THAI
place of birth: CHONBURI
education level: COLLEGE

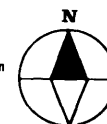
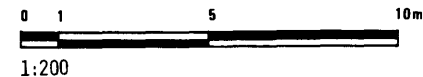
NUMBER OF USERS
married: 2
single: -
children: 3
total: 5

MIGRATION PATTERN
number of moves: -
rural - urban: -
urban - urban: -
urban - rural: -
why came to urban area: -

GENERAL: ECONOMIC
user's income group: MIDDLE
employment: GOVERNMENT WORKER
distance to work: 1 Km.
mode of travel: PRIVATE CAR

COSTS
dwelling unit: \$ 8,000
land - market value: \$ 450,000

DWELLING UNIT PAYMENTS
financing: SELF-FINANCED
rent/mortgage: -
% income for rent/mortgage: -

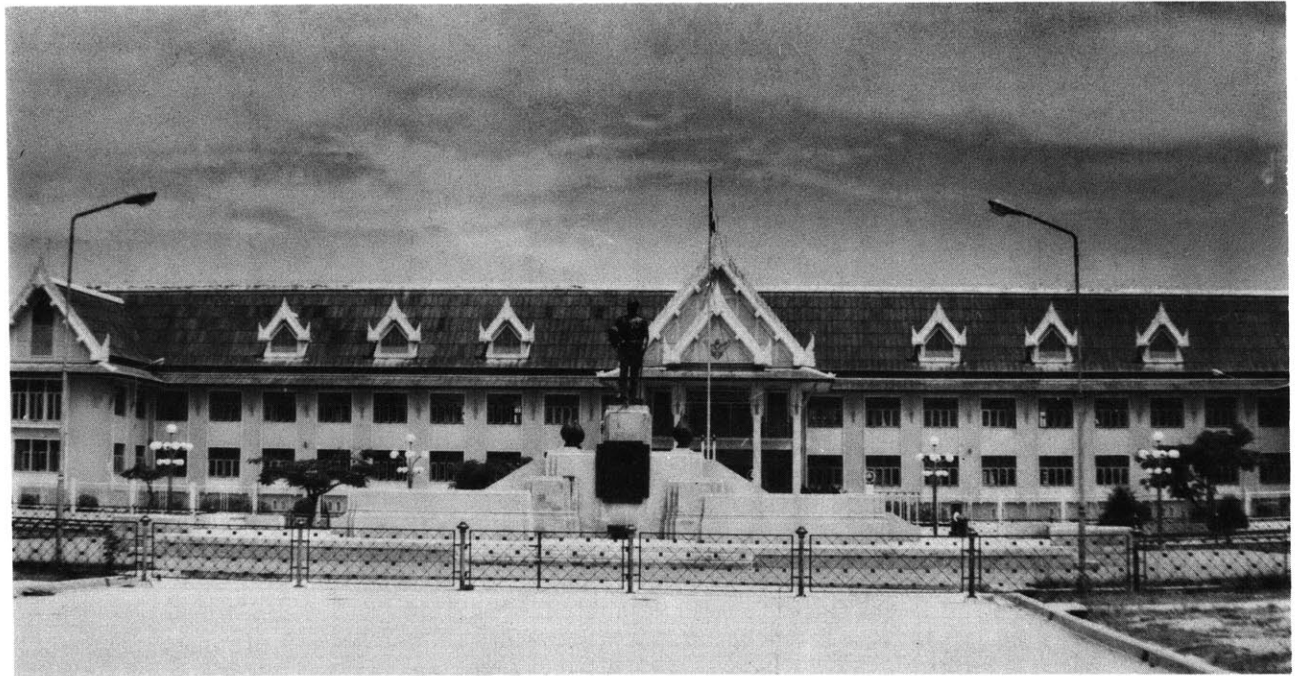


TYPICAL DWELLING

BANG PLA SOI, Chonburi: (top) The Chonburi Provincial office. (1975)

(bottom left) High income detached houses. (1975)

(bottom right) Thai traditional detached houses with multi-use open area at the ground floor and living quarter on the second floor. (1975)



EVALUATIONS

The following sections are contained in the Evaluations:

TIME/PROCESS PERSPECTIVE:

Models relating the case studies to their originating models.

PHYSICAL DATA MATRIX:

A comprehensive summary of the data with comments.

COMMUNITY FACILITIES, UTILITIES, SERVICES MATRIX:

A summary of the availability of facilities.

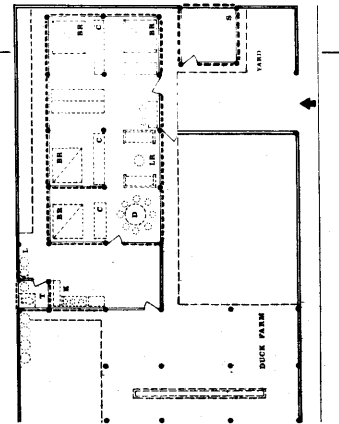
LOCALITY SEGMENT LAND UTILIZATION:

A cross comparison of patterns, percentages and densities of land utilization in the four selected localities.

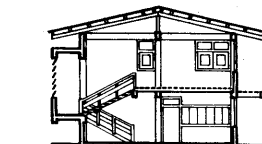
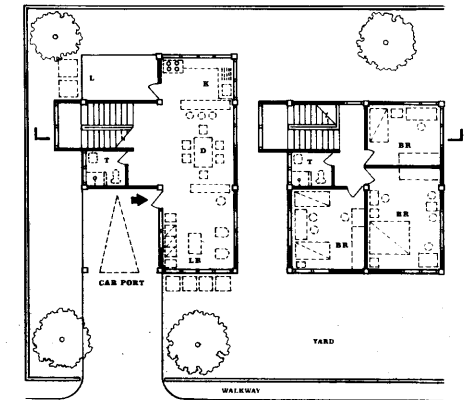
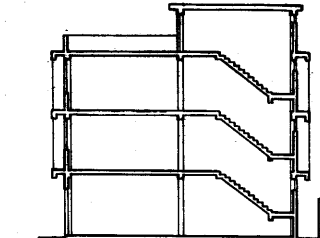
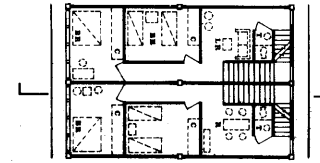
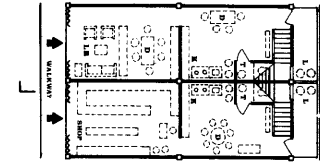
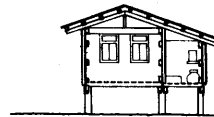
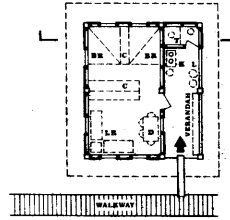
TIME/PROCESS
PERSPECTIVE

EXAMPLES

PLAN



SECTION



	TYPE	I	II	III	IV	
		FARM HOUSES	TRADITIONAL DETACHED HOUSES	COMMERCIAL ROW-HOUSES	DETACHED HOUSES	
PAST	LOCALITY	BANG SAI	BAN KHOT	MAKARM YONG	BANG PLA SOI	PAST
	LOCATION	Periphery	Inner Ring	City Center	Inner Ring	
	URBAN LAYOUT	Accretion	Accretion	Accretion	Accretion	
	ORIGIN	Thai Traditional	Thai Traditional	Universal	Universal	
	USERS	Very Low/Low income	Low/Moderately Low Income	Middle/High Income	Middle/High Income	
PRESENT	DENSITY	Low	Medium	Medium/High	Low	PRESENT
	CONFIGURATION	1 story dwelling unit, storage, farm yard.	1 story dwelling unit, verandah.	2-4 stories row-house, Semi-Public/Private back alley.	2 stories dwelling unit, car port, yard.	
	DEVELOPER	Private; Incremental.	Private; Incremental.	Private; Instant.	Private; Instant.	
	USERS	Very Low/Low Income	Very Low/Low Income	Middle/High Income	Middle/High Income	
	DENSITY	Low/Medium	Medium/High	Medium/High	Low	
FUTURE	TREND	Decreasing	Increasing	Increasing	Increasing	FUTURE
	USERS	Very Low/Low Income	Very Low/Low Income	Middle/High Income	Middle/High Income	
	DENSITY	Low/Medium	High	High	Low	
	TREND	Decreasing	Increasing	Increasing	Increasing	

[illegible]

- 1) CATEGORY
- 2) POPULATION PER CATEGORY: Number of people
- 3) PERCENT OF TOTAL POPULATION
- 4) NAME OF LOCALITY. The 4 case studies have been grouped in 4 categories, identifying different income groups and selected physical characteristics:

tricted or made available to the user/occupants as a direct function of the income. The lower in income sectors are directly involved with the provision of shelters, while the middle to high income sectors are relatively uninvolved. The provision of a dwelling and its process become more of a service or a consumable commodity to the high income sectors, while the provision of a dwelling to the low income sectors are more a matter of survival.

6) DWELLING UNIT TYPE: Four types are considered: Shanty, Room, Apartment, House. The pattern is defined in terms of income groups: Shanty: very low incomes; Room: very low incomes; Apartment: very low and low incomes; House: is identified in two types: 1) 2 stories row-house: moderately low and middle incomes, 2) 2 stories detached house: moderately low, middle and high income groups.

8) DWELLING UNIT TENURE: Two types are considered: rental and ownership. Rental is predominant for all income groups. Ownership is found in moderately low (Note: Bang Sai) and in middle/high income groups (Note: Bang Pla-Soi).

9) DWELLING UNIT PERCENT INCOME FOR RENT/
MORTGAGE: From the case studies, it is appar-
ent that the middle and high income tend to
spend a higher proportion of their income on
housing. In general, the percentage of income
allotted for dwelling payments is around 20-
25%. Low income people in public subsidized
generally pay 20% of their income toward rent.

10) LAND/LOT UTILIZATION: A rise in income roughly parallels the change from public to private use of land.

The very low/low income, high density, detached houses leave little private open areas (Note: Ban Khot, above water case). The open areas surrounding the units are used for cooking, laundry, play area for children etc, as well as being public pedestrian routes which preclude privacy and individual maintenance and control. The higher income groups have more private areas according to the physical layout (Note: Bang Pla-Soi).

In brief, the very poor are usually crowded in a room or in a shanty. For this reason, the land around the shelter becomes essential as a living area for most of the daily activities. The very poor, despite this essential need of space, have little or no control over the land around the shelter because it is ordinarily a public or semi-public path or alley. On the other extreme, the higher the income, the larger is the area of the dwelling and the larger the private land available. The land, however, is not a necessity for these income groups.

11) LAND/LOT AREA: Lot boundaries were not defined and therefore not measurable in the case of Ban Khot, above water case.

12) LAND/LOT TENURE: The land/lot tenure pattern in Chonburi is predominately legal rental, which is primarily found at low to middle income groups (Note: Ban Khot, Makarm-Yong). Legal ownership are found in the middle and high income groups (Note: Bang Pla-Soi). The extralegal tenure are found in the very low income level (Note: Ban Khot).

13) DWELLING LOCATION: Middle and high income groups are found in the City Center and Inner Ring (Note: Makarm-Yong, Bang Pla-Soi). Very low, low and moderately low income groups are found in the Inner Ring and Periphery (Note: Bang Sai, Ban Khot).

14) DWELLING TYPE: Detached dwelling types are found in the very low, low, middle and high income groups (Note: Bang Sai, Bang Pla-Sci), the differences are the size of land/lot area and the quality of the houses. The detached unit is the most common model in the urban area.

There is a large proportion of Row/Group housing types in the moderately low and middle income groups (Note: Ban Khot, Makarm-Yong), they are used as residential dwelling unit.

15) DWELLING FLOORS: Most dwelling are generally one or two floors units in all income levels, because of the simplicity of construction and the Thai house tradition.

16) DWELLING UTILIZATION: Two situation are considered: Single and Multiple. Single utilization is found in the most of the high income groups (Note: Bang Pla-Soi). Multiple dwelling occupation is generally in the form of row-houses (Note: Ban Khot, Makarm-Yong), and few detached houses (Note: Bang Sai). They are generally occupied by low to middle income groups.

17) DWELLING PHYSICAL STATE: The pattern of physical state is rather consistent: Bad states are found in the very low and low income groups (Note: Bang Sai, Ban Khot); Fair states are found in moderately low and middle income groups (Note: Makarm-Yong); Good states are found in middle and high income groups (Note: Bang Pla-Soi).

The physical state is a subjective qualification that may only be taken as a reference. It is determined by many factors of which the income may not be significant. For example: Social factors: Culture, degree of acculturation, individual/family habits; individual/family characteristics; Economic factors: Income level; Physical factors: Climate, local resources, dwelling/land tenure, dwelling/land utilization.

18) DWELLING DEVELOPMENT MODE: The pattern is very distinctive: Incremental development is found in the very low and low income levels (Note: Bang Sai, Ban Khot); Instant development is used by the middle and high income levels (Note: Makarm-Yong, Bang Pla-Soi).

19) DWELLING DEVELOPER: The expected developer pattern is generally apparent in Chonburi: the popular developer is primarily found in the lowest income groups (Note: Ban Khot, above water case). The private developer

is found for the low/middle/high income groups (Note: Bang Sai, Ban Khot, Makarm-Yong, Bang Pla-Soi). The public developer is involved in providing housing only for middle and high income groups (Note: Bang Pla-Soi), it has not involved in providing housing for lower income groups for fear of financial lost or too little profit can be made.

20) DWELLING BUILDER: The generally expected pattern may be seen from the case studies: Self-help methods are employed by the very low income groups to build their own houses (Note: Ban Khot, above water case); most of the low income people generally employ artisan to build their houses (Note: Bang Sai, Ban Khot); small contractors build individualized units for the high income (Note: Bang Pla-Soi); and also group of row-houses for the middle income (Note: Makarm-Yong); large contractors build large scale commercial dwelling for the middle income in the City Center (Note: Makarm-Yong).

21) DWELLING CONSTRUCTION TYPE: The pattern of construction type can be summarized as follows: the lower is the income group, the less permanent is the construction; the higher is the income group, the more permanent is the construction.

In the very low income groups, scrap materials and wood are used in constructing the dwelling units where self-help methods are employed.

Wood and masonry/wood construction types are used in building houses for other income groups. Reinforced concrete and concrete blocks are used in building commercial row-houses.

22) DWELLING DEVELOPMENT-YEAR OF CONSTRUCTION: The oldest case study is Makarm-Yong, the City Business District, located in the City Center and built in 1930's. The latest case study is Bang Pla-Soi, the Government Offices District and middle/high income dwelling, located in the Inner Ring and built in 1950's.

23) DWELLING DEVELOPMENT-DENSITY: Population densities are intended as indicators each dwelling group. Therefore, examples were taken from selected, small, homogeneous areas that include the land of a group of dwellings

and their circulation access. The area do not include public land for community services.

There is a clear pattern between density and income group: lower densities characterize high income groups; higher densities characterize low income groups. There is also a clear pattern between density and dwelling unit type: lower densities respond to houses; higher densities respond to shanties, row-houses.

COMMUNITY FACILITIES, UTILITIES/SERVICES MATRIX

Category	Population per Category	% of Total Population	LOCALITIES	COMMUNITY FACILITIES					UTILITIES AND SERVICES									Locality	
				Police	Fire Protection	Health	School, Playgrounds	Recreation	Water	Sewerage *	Storm Drainage	Electricity	Gas (in containers)	Refuse Collection	Public Transportation	Paved Roads, Walkways	Telephone		Street Lighting
A	7,220	13.3%	1. Bang Sai	■	■	■	■	■	■		■	■	■	■	■	■	■	■	1
B	8,320	15.1%	2. Ban Khot (on land)	■	■	■	■	■	■		■	■	■	■	■	■	■	■	2
			(over water)	■	■	■	■		■		■	■			■	■	■		
C	11,680	21 %	3. Makarm-Yong	■	■	■	■	■	■		■	■	■	■	■	■	■	■	3
D	27,870	50.6%	4. Bang Pla-Soi	■	■	■	■	■	■		■	■	■	■	■	■	■	■	4
			Total																

The matrix illustrates the approximate availability of community facilities, utilities, and services in the 4 dwelling environments. Three levels are indicated as follows:

□	No provision at all
■	Limited or occasional
■	Adequate or normal

The matrix clearly indicates that the level of availability is directly related to the income sectors, and/or the physical constraints.

Case 1 rates "limited". This case is from the low and moderate low income sectors who live in the sanitary district of Chonburi, comprising approximately 7,220 or 13.3% of the population in Chonburi.

Case 2 rates "none", "limited" and "adequate". This case is from the very low, low and moderately low income sectors, comprising approximately 8,320 or 15.1% of the population in Chonburi.

Cases 3,4 rate "adequate". These cases are from the middle and high income sectors, comprising approximately 39,550 or 71.6% of the population in Chonburi.

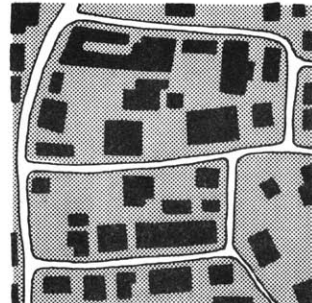
* No public sewerage. Only pit latrines in Bang Sai, Ban Khot; and septic tanks in Makarm-Yong, Bang Pla-Soi, all provided by users.

LOCALITY SEGMENT LAND UTILIZATION: PATTERNS, PERCENTAGES, DENSITIES

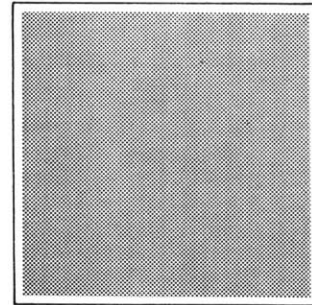
1 BANG SAI

Houses: private ownership

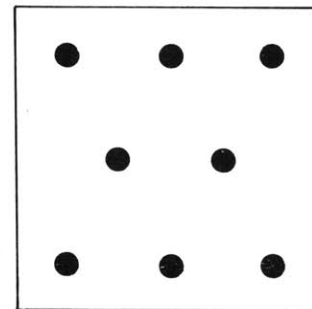
Very low percentage of land for public streets, walkways; no semi-public open area; high percentage of land for private use. Low population density and poor environmental condition.



PATTERN 1 Hectare



PERCENTAGES	Streets/Walkways	9%
	Playgrounds	-
	Cluster Courts	-
	Dwellings/Lots	91%

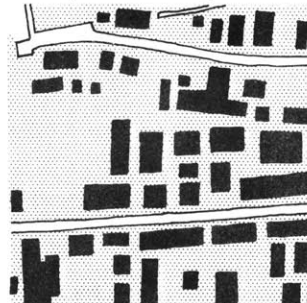


DENSITY Persons/Hectare 167

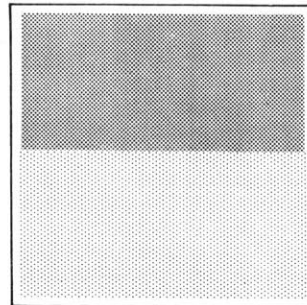
2 BAN KHOT

Houses: private rental/ownership

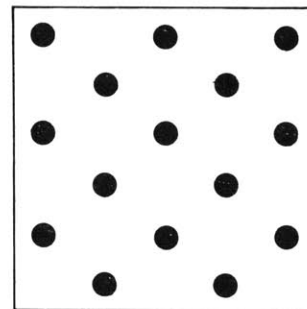
Very low percentage of land for public streets, walkways; high percentage of open space which is swamp area; the private utilization is the sheltered for dwellers only. High population density and unhealthy area.



1 Hectare



	Streets/Walkways	8.7%
	Playgrounds	48 %
	Cluster Courts	-
	Dwellings/Lots	43.3%

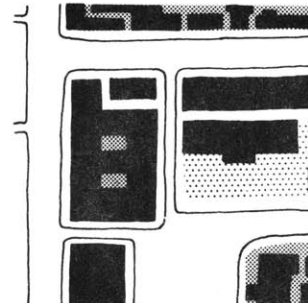


310 P/Ha

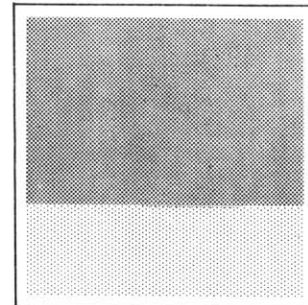
3 MAKARM YONG

Houses: private rental/ownership

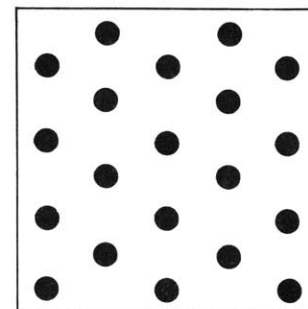
Low percentage of land for public streets, walkways. High percentage of land for semi-public uses: schools, temples, social services, etc. High population density.



1 Hectare



	Streets/Walkways	9.4%
	Playgrounds	33.1%
	Cluster Courts	-
	Dwellings/Lots	57.5%

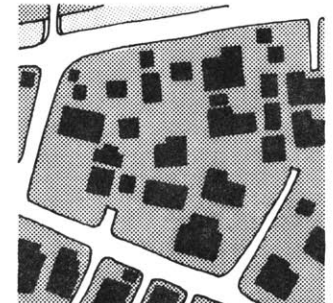


400 P/Ha

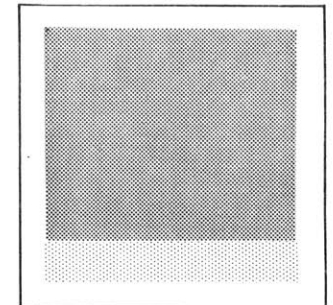
4 BANG PLA SOI

Houses: private ownership

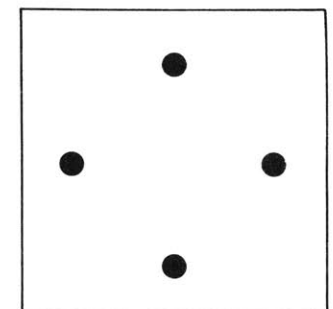
High percentage of land for public streets, walkways and semi-public open areas. Low population density, tenants are of the high income sectors.



1 Hectare



	Streets/Walkways	17.5%
	Playgrounds	15 %
	Cluster Courts	-
	Dwellings/Lots	67.5%



79 P/Ha

KEY

Public:	streets/walkways	
Semi-Public:	playgrounds	
Semi-Private:	cluster courts	
Private:	lots	
	dwellings	

● 20 Persons

URBANIZATION ALTERNATIVE

OBJECTIVE

The goal of this study is to provide a framework and a set of alternative guidelines for approaching the incremental planning and design procedure for urbanizing land in Chonburi with a particular emphasis on the New Town Site and Services Project at Tambol Sa-Med.

The area of the above study is a 446.5 hectare site, 1 kilometer to the west of the Chonburi Municipal City, presently under construction. The project was expected to be finished by 1974, but the lack of financial support, the political situation, and inadequate planning procedures continue to push back the date of completion.

Evaluation and revision of the project at this point will allow the government to adapt and adjust the future development.

It should be understood that this study is not a solution to the problem of the existing development, but only an alternative reference/information for various agencies involved in the planning for residential development, and it can be studied in greater depth for the formulation of a specific policy of growth and development of residential areas in both the New Town and Municipal City of Chonburi.

The structuring of the land development processes through staging can reflect the anticipated and un-anticipated changes necessary to future growth. In part, incremental planning and design procedures can provide the means for development with the least waste of public and private resources and at the same time allow for the greatest flexibility and efficiency of resources.

In order to proceed with incremental planning, it is necessary to establish the major determinants. The assumptions that urbanization will take place, land values will rise, population and building densities increase, that commercial growth will naturally follow certain patterns if allowed to, all demand that the land must be structured under specific tenure patterns, which will allow for growth and change as the development matures. This study is directed to this aim.

The text of the study is organized into three categories enabling the reader to synthesize each aspect:

- ASSUMPTION
- CONSEQUENCE
- ACTION

General projections will be made as internal influences on the developing site.

SA-MED SITE AND SERVICES PROJECT

The City Planning Division, Ministry of Interior, estimates that the population of Chonburi Municipal City will reach 171,000 by 1990, and the increase in land use will be three times greater than it is at present. Therefore, the land requirement for future is immense. This together with the existing severe deficiencies in every aspect within the City, implies the need for other schemes to relieve the pressures from the Municipal City as soon as possible.

For this reason, a New Town was proposed to be established at Tambol Sa-Med, 1 kilometer to the west of Chonburi Municipal City. The site appeared to be suitable for development as it was an undeveloped public land, due to this fact, no legal problems or other obstacles for the development of the site were foreseen.

In April 1966, the reservation for all lots in the New Town was open to public, and within 15 days, all 2761 lots and 650 row-houses were reserved. Then, in February 1968, the construction of the New Town was begun, and it is still under construction in 1976.

(opposite page) The air photograph of the project site and Chonburi Municipal City. (1965)

SA-MED SITE AND SERVICES PROJECT, CHONBURI, THAILAND

CHONBURI MUNICIPAL CITY

GULF OF THAILAND

ANG SILA

PROPERTY LINE

RESERVED AREA

TO BAN BUNG

THE PROJECT SITE

LAMU CANAL

SUKHUMWIT HIGHWAY

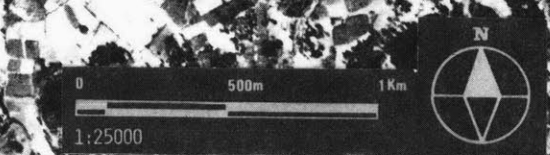
TO BAN NONG KHANG KHOK

PRIVATE FARM LAND

PRIVATE FARM LAND

TO SRI RACHA

PLAN OF SITE



BASIC DATA OF THE SITE

LOCATION:

The site is approximately 1 kilometer from the Chonburi Municipal City. It is an undeveloped public area.

AREA:

Gross area of the site = 446.5 hectare.

BOUNDARIES:

North: Gulf of Thailand
East : Lamu Canal
South: Private farm land
West : Kamoy Canal

ACCESS:

Access road does not exist on site. The nearby circulation routes are Sukhumvit Highway, approximately 1 kilometer to the south, and the highway to Ang Sila, approximately 500 meters to the west.

TOPOGRAPHY:

The site is a marsh/swamp area covered with several kinds of brushwood.

NATURAL DRAINAGE:

There are 6 canals serving as natural drainage of the site.

FLOODING:

The marsh area of the site is prone to frequent flooding.

SOIL CONDITION:

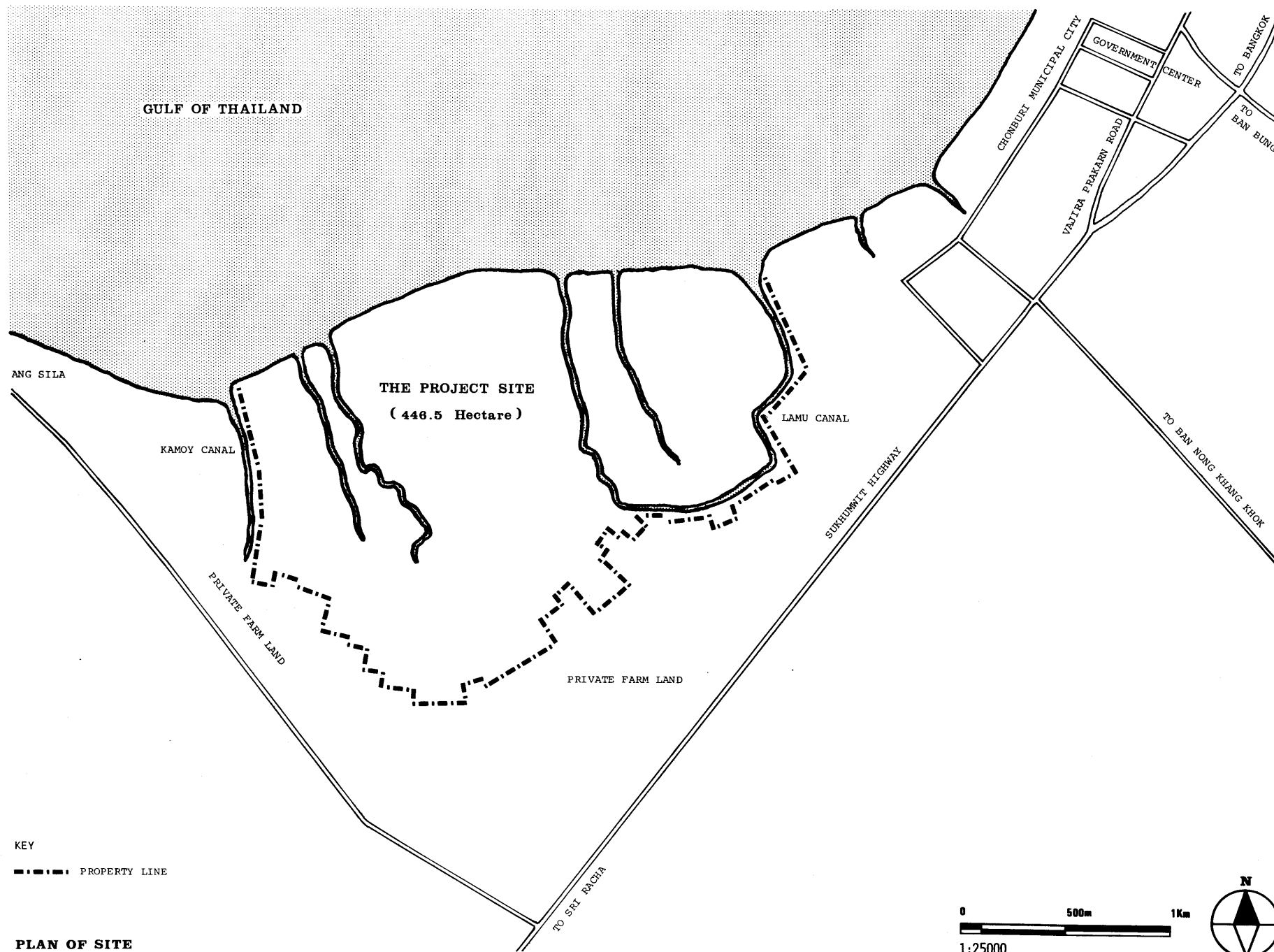
- 1st. level 2-4 m. depth: soft clay
- 2nd. level 4-7.5 m. depth: sand, sea shell
- 3rd. level 7.5 m. depth: sand, hard clay

LAND OWNERSHIP:

The site is a public land preserved for making charcoal since 1928. There are only 29 squatter families on the site.

ZONING:

The development of the site is not based on the Master Plan for Chonburi proposed by the City Planning Division, Ministry of Interior. It is based on the availability of public land which has the least legal problems for the implementation of the New Town.



EXISTING SITE DEVELOPMENT

The local authorities in Chonburi have initiated the implementation of the New Town since 1968, in order to alleviate the growing congestion of population in the existing urban area. The development is subsidized by the local finance. This course of action is indicative of the possibility that in future the local authorities might be able to assume greater responsibility in national development.

The completion of the project was expected to be in 1974, but due to the lack of adequate financial support and many other factors, the project is still under construction at present. No sign of success is foreseen.

Most of the major streets and secondary streets have been completed at the existing site development as follows:

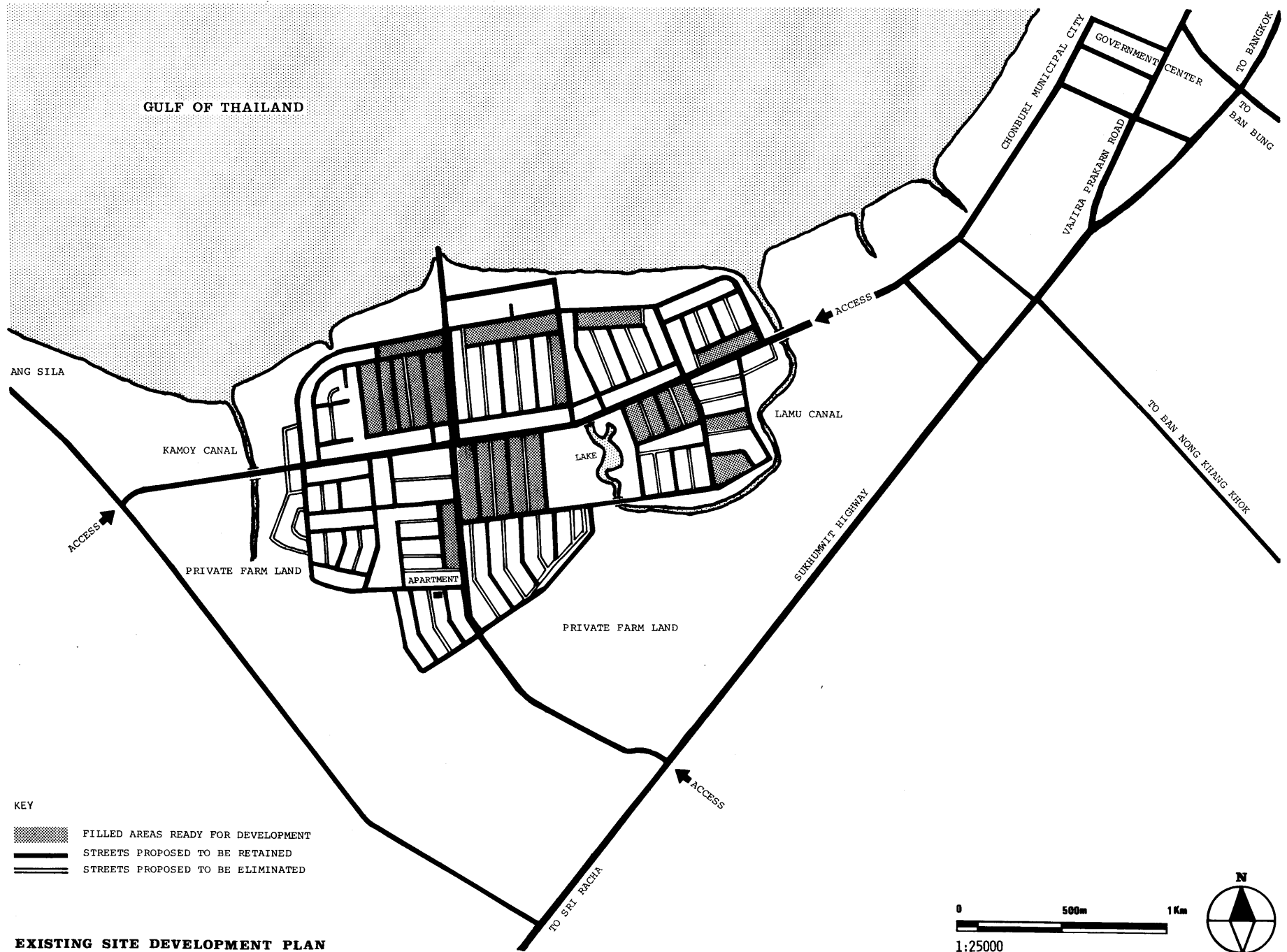
STREET WIDTH/ PLANNED LENGTH/COMPLETED LENGTH

60 m.	585	585
30 m.	3,968	3,968
20 m.	5,926	5,446
15 m.	12,142	11,642
10 m.	21,218	20,718

All the streets are compact soil aggregate. The paving of streets will be staged in future.

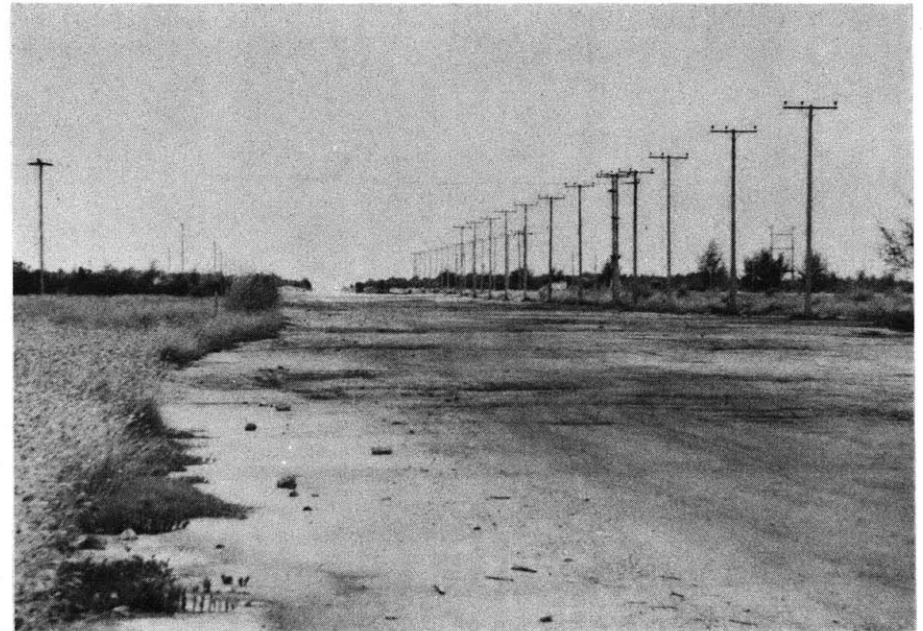
There is only one existing building on the site, a 32-unit apartment, temporarily used by the constructing firm as the construction headoffice.

Few areas have been filled in (as shown in the plan). A man-made lake has been built in the area where the central park is planned to be located. The precast concrete poles for electricity along the major streets have being installed. The lots have not yet been allocated.



ASSUMPTION

The site is partially developed with the layout of streets and filled areas as shown in the opposite page. It is assumed that the future developments will minimize public circulation and retain only the streets that are absolutely necessary.

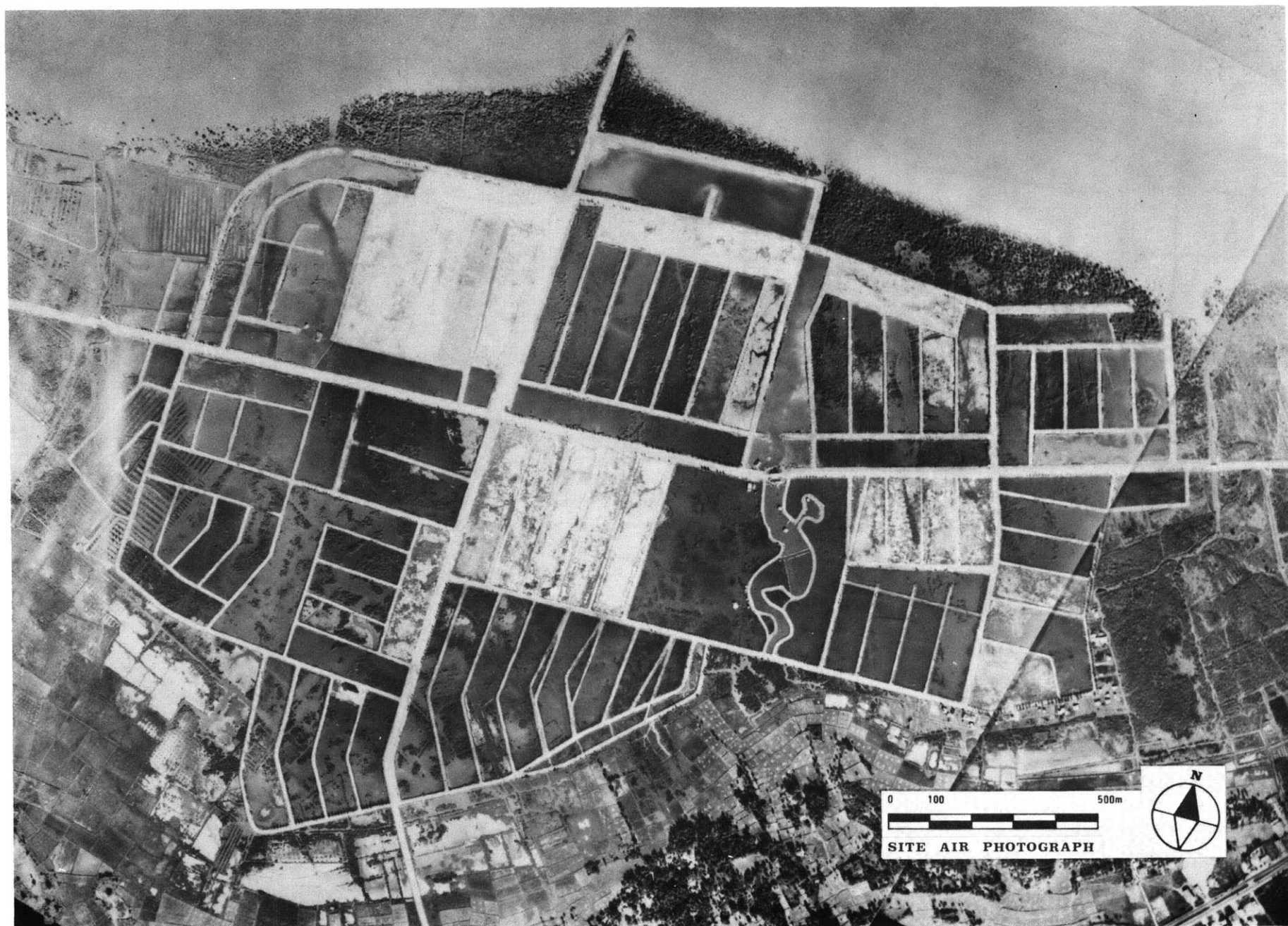


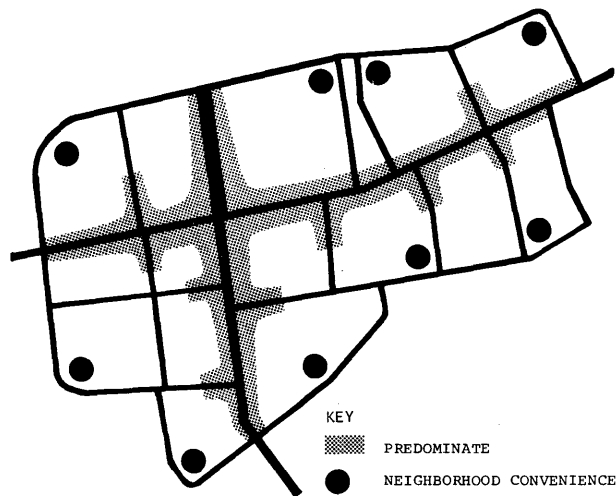
SA-MED, Chonburi: (top) A general view of the existing site development along the main street, extended from the Government Center. (1975)

(bottom) A 32-unit apartment, temporarily used as the construction headoffice. (1975)

(opposite page) The air photograph of the existing site development. (1974)







LAND COMMERCIAL POTENTIAL/DEMAND PROJECTION LAND VALUE PROJECTION

ASSUMPTIONS:

COMMERCIAL GROWTH:

- That predominate commercial activity will develop in linear patterns along major circulation networks and transportation routes: intra-community street, collector street (minor).
- That predominate commercial growth will not occur along: neighborhood street, paths.
- That scattered (neighborhood) convenience commercial will develop in a random pattern within neighborhoods. The location of such is generally on the corner lots or intersections.

RESIDENTIAL GROWTH:

- Surface or spread development.

INDUSTRIAL GROWTH:

- Spot or point development.

EDUCATION GROWTH:

- Spot or point development.

PUBLIC SERVICES (NON-UTILITIES):

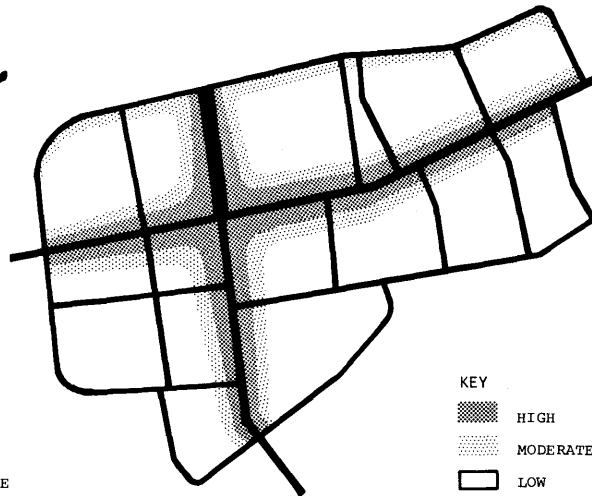
- Spot or point development.

CONSEQUENCE:

- Land value and population density can be expected to be highest in the predominate commercial areas.

ACTION:

- Plan these areas in such a manner that they will be able to re-adjust to higher land values and other priorities through incremental planning.



ASSUMPTIONS:

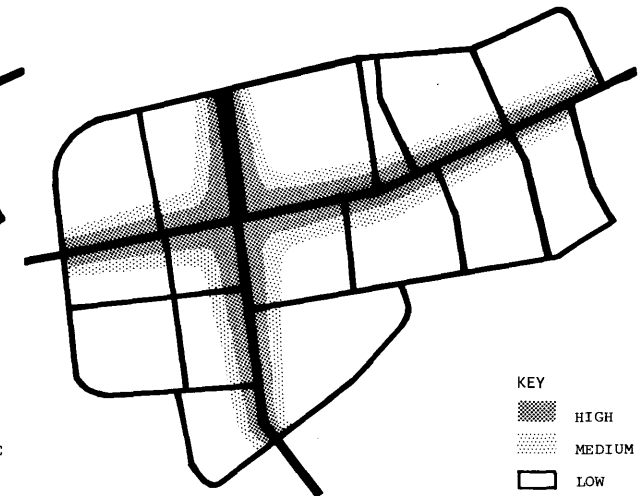
- That the process of urbanization will cause land values to rise in relation to demand over a period of time.
- That as a result of commercial growth patterns, land value will be highest in the areas of commercial activity.
- That the land value of seaside areas with good advantage in view will be higher than the inner areas.

CONSEQUENCE:

- Initially, these areas will not command significantly higher purchase prices, but due to intensification of development will command the highest land values.

ACTION:

- Plan these areas in a flexible manner in order that re-adjustment over time to other priorities may be accomplished to reflect these land value projections.



POPULATION DENSITY PROJECTION

ASSUMPTION:

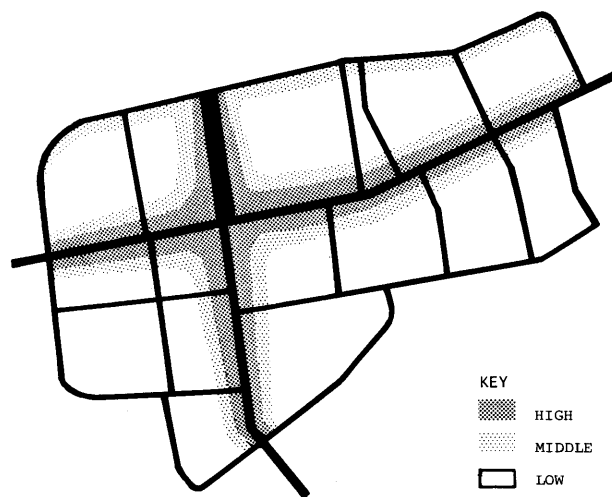
- That population density will be highest in the areas of commercial activity.
- That population on adjacent areas can be expected to be high also.

CONSEQUENCE:

- Initially, the development will not be large enough to attract extensive commercial activity as shown in the projected high density stage, but unless the initial use of the land will permit future expansion of commercial activity and other high priorities, the development can be expected to stagnate, or grow in constrained fashion.

ACTION:

- Allocate land use functions according to priorities, stability, and flexibility for growth from the initial stage to the high density stage.



KEY

■ HIGH

□ MIDDLE

□ LOW

INCOME GROUPS PROJECTION

ASSUMPTION:

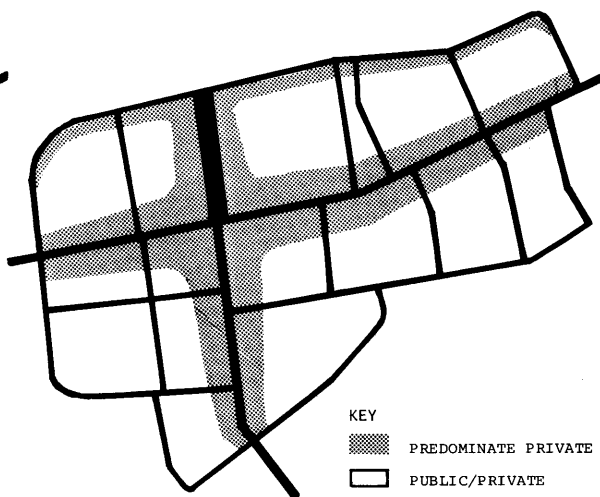
- That the income groups will be related to the land value, thus the higher income groups will be found in/near the commercial activity areas where the land value is high.

CONSEQUENCE:

- Initially, the development will not be diverse enough to achieve the dispersion of different income groups as shown in the projection, unless the initial use of the land will provide for change through incremental and flexible development of urbanization over time.

ACTION:

- Allocate land use functions in a flexible manner that re-adjustment over time may be accomplished to reflect these income groups projection.



KEY

■ PREDOMINATE PRIVATE

□ PUBLIC/PRIVATE

BASIC SUBDIVISION PROJECTION

ASSUMPTIONS:

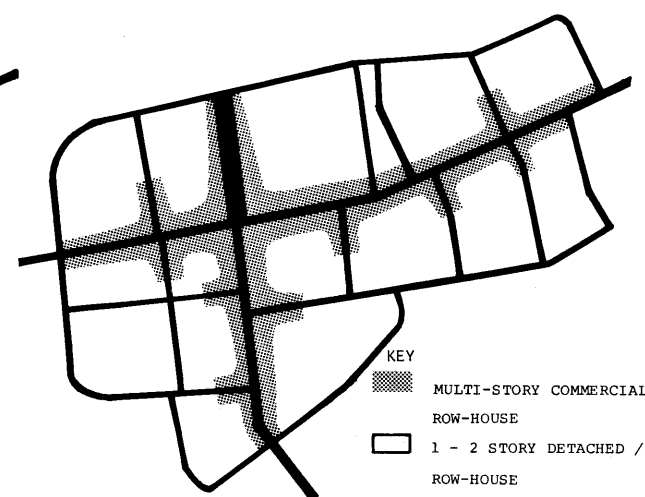
- That the location of public sectors will be on the areas where the land value is low, or have the smaller side along the high value land.
- That the location of private sectors will be on the areas where the land value is high or moderately high, due to the economical benefits and initial capital investment.

CONSEQUENCE:

- That the location, facilities, provided, and procedures for planning the development will insure the success of the future by allowing for an anticipated and natural growth pattern.

ACTIONS:

- Individual project redesign of circulation networks, block configurations, land use function, and staging for growth.
- The location for the initial stage should be located such that the land deemed most propable to develop into intense commercial activity is not developed initially, but is reserved for growth based on demand.
- The paving of streets must be programmed in stages corresponding to the scale of priorities in the overall concept of development. Initially, it may be possible to pave only the circulation paths with the greatest amount of traffic: the intra-community streets, collector streets, which will probably served as transportation routes. The minor neighborhood streets and paths do not need to be paved initially due to the lack of automobile traffic and lower priority.



KEY

■ MULTI-STORY COMMERCIAL

□ ROW-HOUSE

□ 1 - 2 STORY DETACHED / ROW-HOUSE

DWELLING TYPES PROJECTION

ASSUMPTIONS:

- That the dwelling types will reflect the aspects of the previous assumptions: land use, land value, population densities and income groups.
- That the dwelling type for high income groups in the commercial land use function areas where the land value and population densities are high will be grouped in the form of multi-story row-houses along the major streets.
- That the dwelling type for middle income grouped will be detached/row house along the minor streets where the land value is moderately low. The number of floor will be 1-2 stories.
- That the dwelling type for low income groups will be 1 story detached house around the inner areas where the land value is low.

CONSEQUENCE:

- The subdivision of land should be flexible to meet arising demand of different dwelling types.

ACTION:

- A variety of dwelling types should be planned to meet conditions of groups at different economic levels. Each providing a means for incremental growth thereby maximizing flexibility to meet each groups' condition. This growth is related to the development of personal resources. From this procedure can come a detailed planning of lots for the best use of the site, and flexibility of shelter use and expansion.

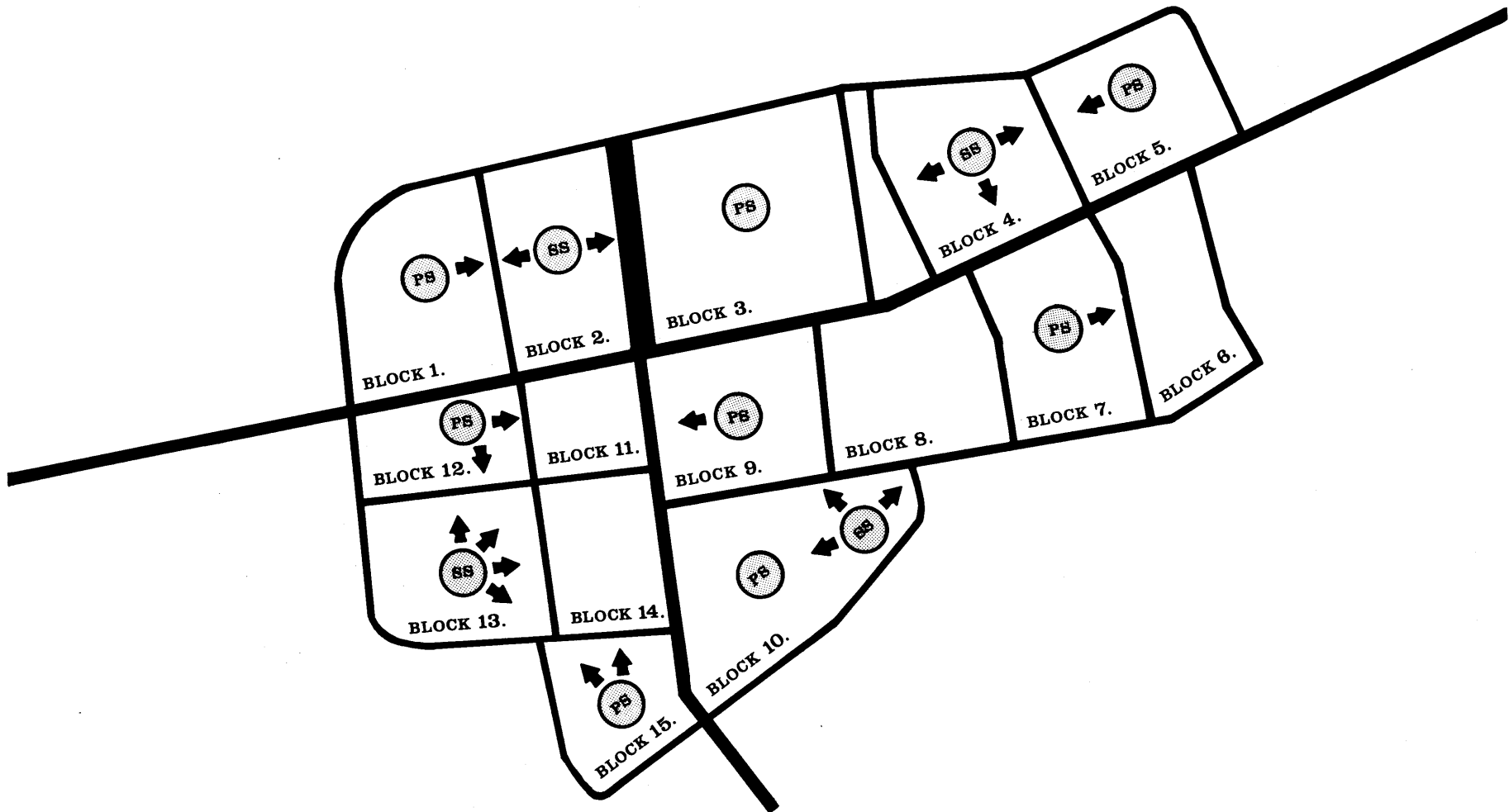
The following table shows:

1. BLOCK:
 - Basic subdivision of land, based on the existing inter-community streets.
2. GROSS AREA:
 - Area of each block.
3. LAND USE:
 - Private and Public uses.
4. BUILDING TYPE:
 - As suggested in the Master Plan for Chonburi, 1988, by the City Planning Division, the Ministry of Interior, for different densities building types.
5. PROJECTED AREA:
 - Based on the existing street layout and previous projections.
6. PERCENTAGE OF LAND:
 - Percentage of each projected area.
7. DENSITY:
 - As suggested in the Master Plan for Chonburi, 1988.
8. POPULATION:
 - Number of population in each block.
9. AVERAGE FAMILY SIZE:
 - As projected in the Master Plan for Chonburi, 1988.
10. AVERAGE NUMBER OF PRIMARY SCHOOL:
 - Assumed that every 5,000 people require 1 primary school.
11. AVERAGE NUMBER OF SECONDARY SCHOOL:
 - Assumed that every 10,000 people require 1 secondary school.

TABLE OF

POPULATION AND REQUIRED SCHOOLS

1. BLOCK	2. GROSS AREA Ha.	3. LAND USE	4. BUILDING TYPE	5. PROJECTED AREA Ha.	6. % OF LAND	7. DENSITY PERS./Ha.	8. POPULATION 5.x 7.= N°	9. AVERAGE FAMILY SIZE	10. AVERAGE NO. OF PRIMARY SCHOOL	11. AVERAGE NO. OF SECONDARY SCHOOL
1.	17.5	A) high den.private B) mod. den.private C) low den.private D) public/semi-public	A) com.row-house B) semi-detached C) detached D) school	0.8 2.2 9.3 5.2	4.3 12.7 53 30	785 375 225	625 825 2,090	6		
TOTAL				17.5	100		3,540		0.7	0.3
2.	15.3	A) B) C) D)	A) B) C) D)	1.4 4 5.4 4.5	8.8 26.4 34.8 30	785 375 225	1,100 1,500 1,215	6		
TOTAL				15.3	100		3,815		0.8	0.4
3.	24	A) B) C) D)	A) B) C) D)	1.8 5.5 9.5 7.2	7.6 23 39.4 30	785 375 225	1,410 2,060 2,125	6		
TOTAL				24	100		5,595		1.1	0.5
4.	15.9	A) B) C) D)	A) B) C) D)	0.8 2.2 8.2 4.7	4.7 14.1 51.2 30	785 375 225	625 825 1,845	6		
TOTAL				15.9	100		3,295		0.6	0.3
5.	12.6	A) B) C) D)	A) B) C) D)	0.8 2.4 5.7 3.7	6.3 19.9 44.8 30	785 375 225	625 900 1,280	6		
TOTAL				12.6	100		2,805		0.6	0.3
6.	11	A) B) C) D)	A) B) C) D)	0.5 1.4 5.8 3.3	4.4 17 52.6 30	785 375 225	375 540 1,300	6		
TOTAL			market	11	100		2,215		0.4	0.2
7.	14	A) B) C) D)	A) B) C) D)	0.6 1.8 7.4 4.2	4.3 12.7 53 30	785 375 225	470 675 1,665	6		
TOTAL				14	100		2,810		0.6	0.3
8.	17.5	D)	public offices							
9.	15	A) B) C) D)	A) B) C) D)	1.3 3.9 5.3 4.5	8.8 26.4 34.8 30	785 375 225	1,020 1,460 1,190	6		
TOTAL				15	100		3,670		0.7	0.4
10.	20	A) B) C) D)	A) B) C) D)	1 3 10 6	5 15 50 30	785 375 225	785 1,125 2,250	6		
TOTAL				20	100		4,160		0.8	0.4
11.	7.5	A) B) C) D)	A) B) C) D)	2.6 2.6 2.3 7.5	35 35 30 100	785 375	2,040 975	6		
TOTAL			market				3,015		0.6	0.3
12.	9	A) B) C) D)	A) B) C) D)	0.8 2.2 3.3 2.7	8.3 24.9 36.8 30	785 375 225	625 825 740	6		
TOTAL				9	100		2,190		0.4	0.2
13.	11.2	C) D)	C) D)	7.8 3.4	70 30	225	1,750	6		
TOTAL				11.2	100		1,750		0.3	0.2
14.	10.7	A) B) C) D)	A) B) C) D)	0.7 2.1 4.7 3.2	7 19 44 30	785 375 225	550 785 1,055	6		
TOTAL				10.7	100		2,390		0.5	0.2
15.	9.5	A) B) C) D)	A) B) C) D)	0.4 1.2 5.1 2.8	4.2 12.6 53.2 30	785 375 225	315 450 1,445	6		
TOTAL				9.5	100		1,910		0.4	0.2
GRAND TOTAL							43,160		8.5	4.2



KEY

- PS PRIMARY SCHOOL
SS SECONDARY SCHOOL
← AREA SERVED

PROJECTION OF SCHOOL LOCATION AND AREA SERVED

0 100 500m
1:15000



LAND USE

The proposed plan is intended to show the basic subdivision of land on the existing developing site, based upon the previous assumptions and projections.

PLANNING CRITERIA:

- The major existing intra-community streets are all retained.
- Some existing secondary streets are also retained if advantage can be taken.
- Few streets are proposed to shorten the walking distance.

LAND USE CRITERIA:

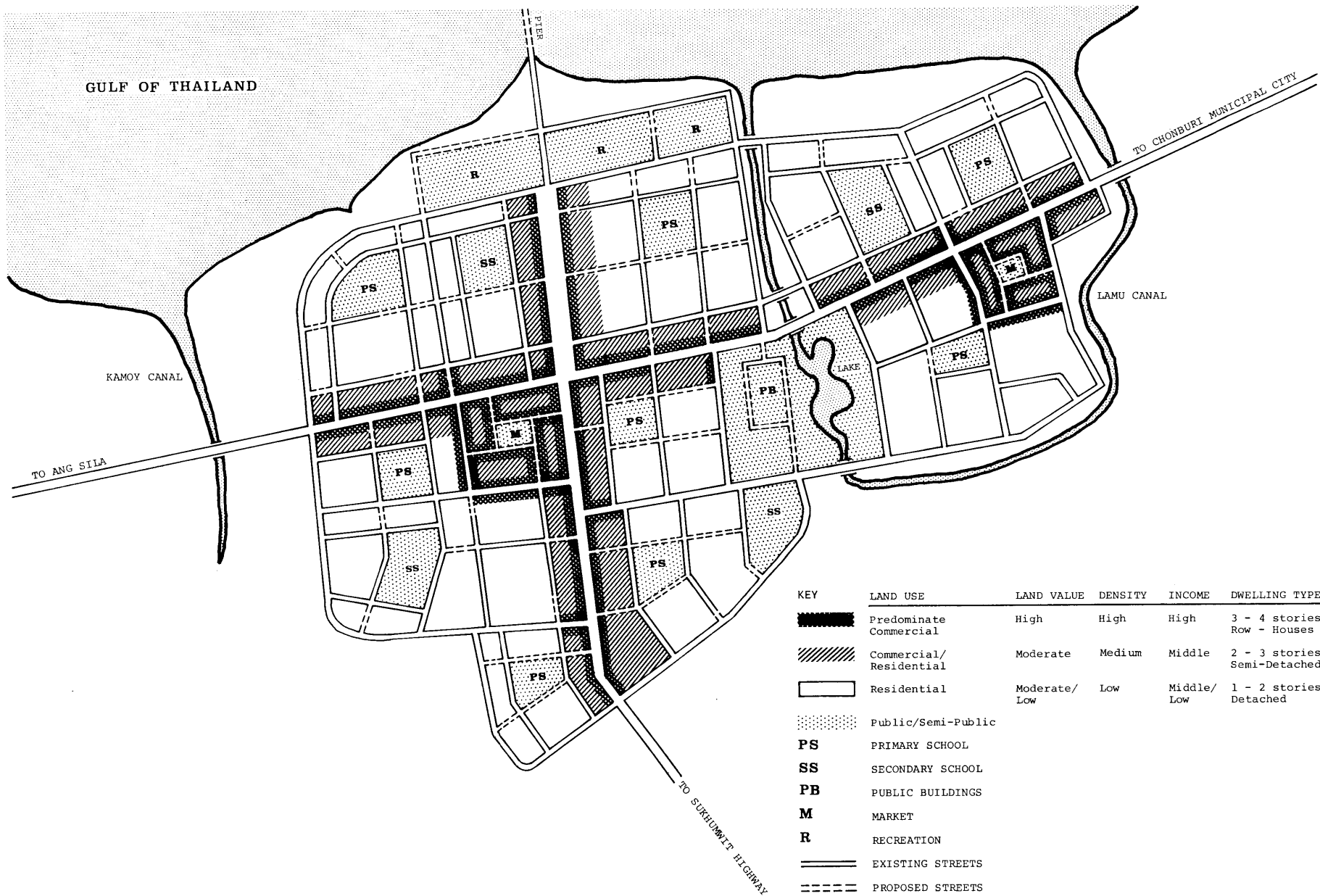
- Every subdivision of land will be within walking distance and have/share supporting public services in the form of elementary schools, community center, utilities, transportation facilities, etc.
- The private sector is located on the high/moderately high value land: periphery of block, along intra-community streets.
- The public sector is located on the moderately low value land: center/inner part of block.

CIRCULATION CRITERIA:

- The circulation network will provide a basic framework for the development of the site.
- Pedestrians and vehicles will be mixed in the public streets, but pedestrians will dominate over vehicles.
- The traffic frequency and speed will be controlled by the sizes and layout of the streets.

The proposed plan shows:

- **COMMERCIAL AREA:** The commercial areas are located along major streets where the land value is high and have good potential for business.
- **RESIDENTIAL AREA:** The middle income sectors are located near the outer part of block which can easily reach the commercial areas and transportation. The lower income sectors are located around the inner part of block where land value is moderately low.
- **SCHOOLS:** The schools are located at the center of block and easily accessible to all residents in the same/nearby community. The community center can also be attached to the school so that joint use can be made of playground and other facilities for recreation.
- **PUBLIC OFFICES AND PARK:** The public offices and park are located at the central part of the site will make it easy to be reached by all residents
- **MARKET:** The markets are located near the commercial activity area with access easy to transportation.



PROPOSED LAND USE PLAN



CIRCULATION

The circulation network provides a primary ordering framework around which the site is developed. As well as circulation function, the network provides the utility spine throughout the site. The land which is utilised by the circulation grid is considered to be under public ownership providing for paths of movement of both pedestrian and vehicular access.

CIRCULATION CRITERIA:

The circulation plan is proposed by the following patterns:

- All streets will have access from the east-west and north-south main streets. The connection between each access is to reduce travel distance and speed of the traffic.
- There are 4 accesses:
 - EAST ACCESS: From Chonburi Municipal City.
 - SOUTH ACCESS: From Sukhumvit Highway.
 - WEST ACCESS: From Ang Sila District.
 - NORTH ACCESS: Water way from the nearby seaside resorts.

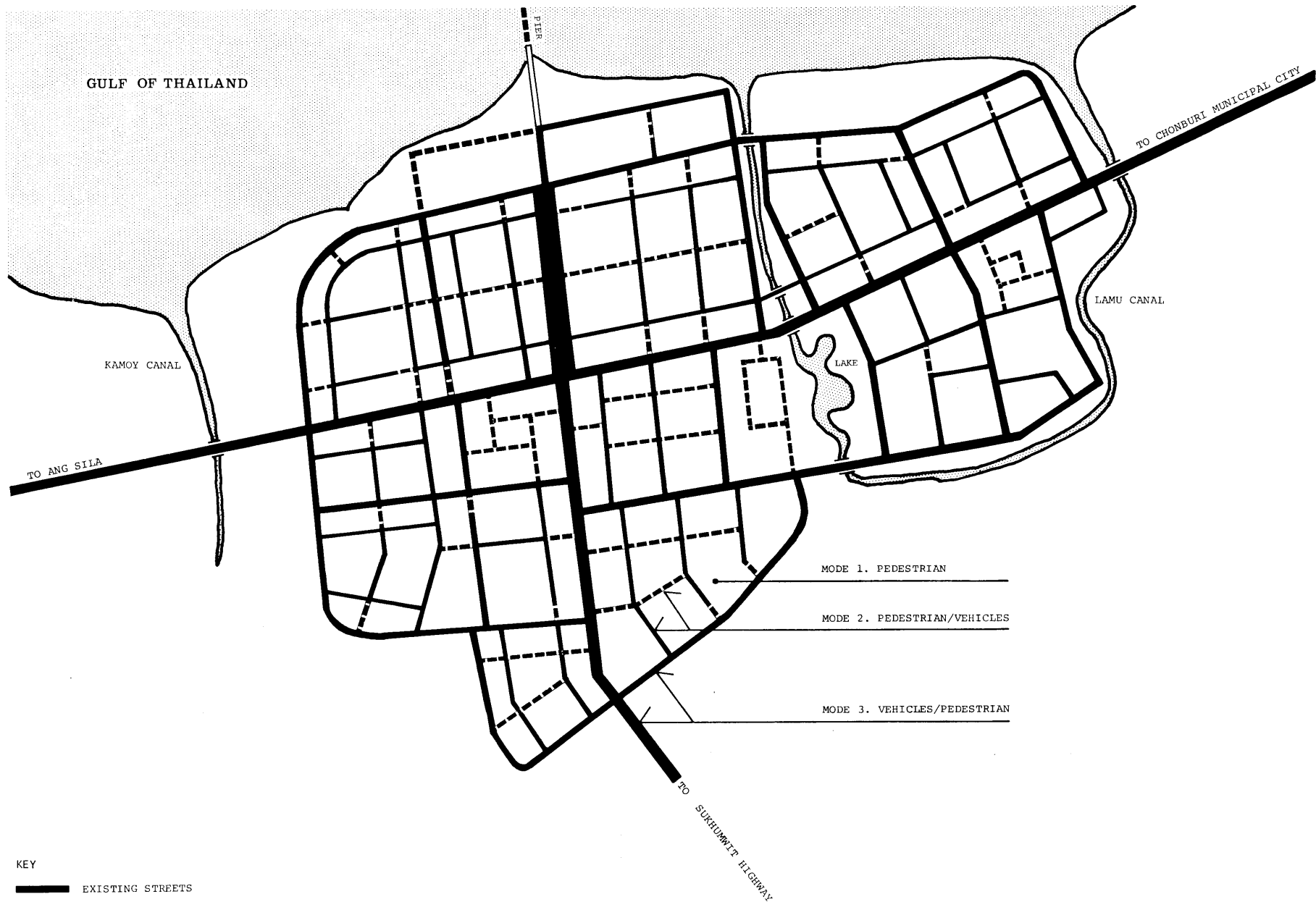
CIRCULATION MODE:

The following circulation conditions are considered in the plan:

- MODE 1 PEDESTRIAN: Exclusive use by pedestrian. Example: pedestrian walkways, cluster courts, parks.
- MODE 2 PEDESTRIAN/VEHICLES MIXED: Pedestrian dominate over vehicles; control of traffic frequency, character, and speed are mainly established by the street layout and use. Example: secondary roads in residential areas.
- MODE 3 VEHICLES/PEDESTRIAN MIXED: Vehicles dominate but do not control circulation; control are established for the protection of pedestrians, crosswalks, traffic lights. Example: main inter-community streets.

TRANSPORTATION:

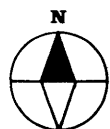
Public transport is proposed to be provided by small buses. It will be more effective in achieving the objective for public transport, as more frequent and convenient services as well as closer access to destinations can be provided. It is expected that through the efficiency of small buses, the services can provide an attractive alternative to the use of private cars, thus resulting in a reduced volume of traffic on the streets.



KEY

- EXISTING STREETS
- - - - - PROPOSED STREETS

PROPOSED CIRCULATION PLAN



DEVELOPMENT MODE

It is both difficult and economically infeasible to develop all the land to meet the needs of a high density population. The site should be incrementally developed to enable commercial and other potential high land value areas to re-adjust to higher land values and other priorities, as the development is intensified.

DEVELOPMENT CRITERIA:

- The site is proposed to be developed in terms of stages, time, population to be settled.
- The initial development will have supporting public and semi-public services and facilities.
- Convenient pedestrian access to public transportation/extension of public transportation.

INITIAL DEVELOPMENT:

- The initial stage is proposed to start along the intersection of the east-west and north-south main inter-community streets.
- The development will include residential, commercial, schools, public facilities, and open areas with basic circulation and infrastructure needed to serve the community.
- In this stage, emphasis should be upon instant process. This will help create an attractive environment and will encourage people to the project.

SUBSEQUENT DEVELOPMENT:

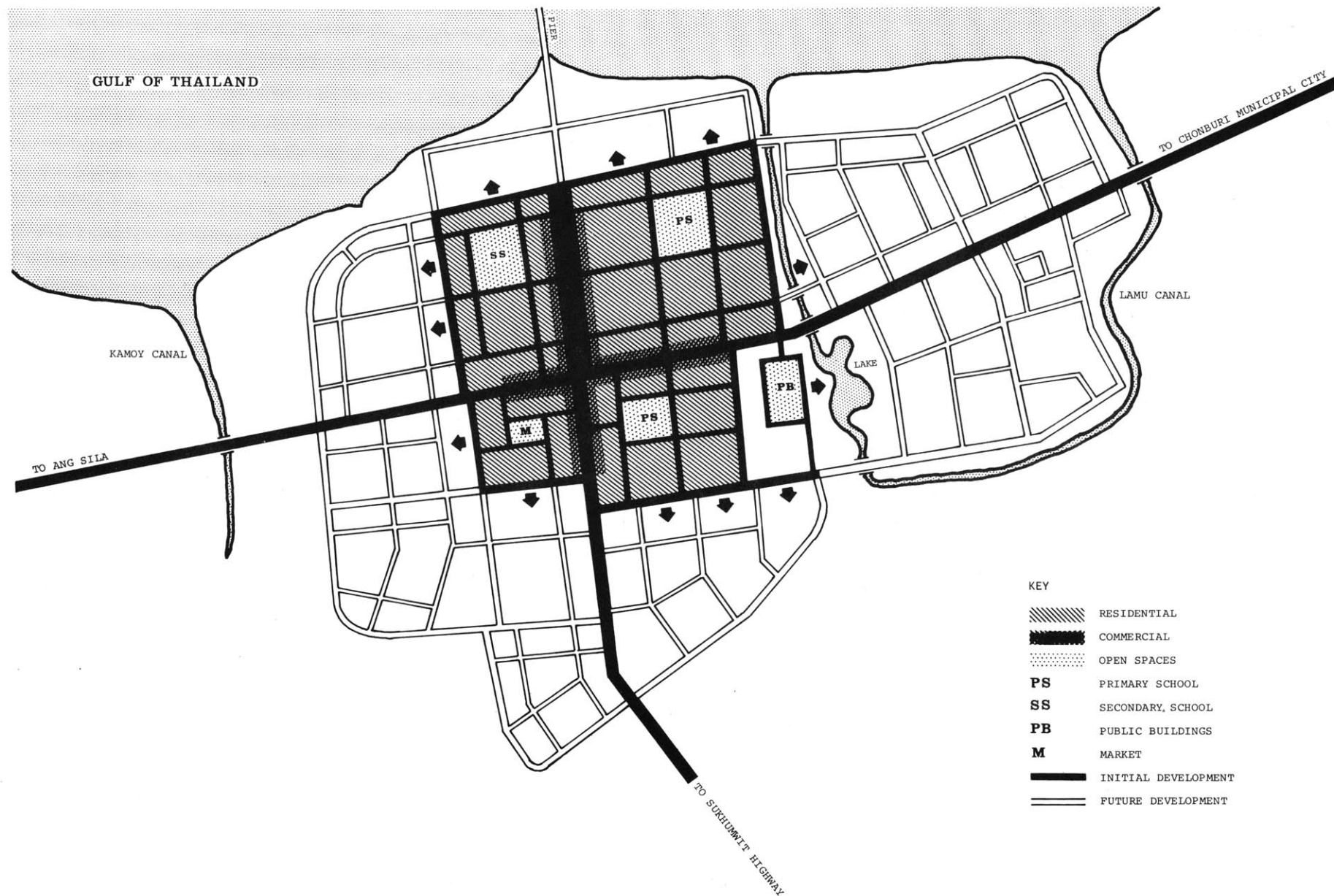
The speed and magnitude of the growth of the site are difficult to forecast. Evaluation or revision of the plan is necessary at this point to improve and adjust the future development according to the needs of the community. However, the plan should enforce/facilitate a compact development instead of a scattered development, and maintain at any stage the consistency between land use/density/commercial potential and intensity of circulation/activities.

MANAGEMENT






It is proposed that a Development Corporation should be appointed by the Ministry of Interior to take the full responsibility for the development of the site. This will be a legal entity with powers to manage the land and other property, to carry out the overall operations, and to carry on any undertaking necessary for the purposes of the development.

The Corporation should be financially supported by the Ministry of Finance or other government's financial institutions. The finance may be by way of advances or loan at a low interest rate, and should be payable over a long period.

Co-operation between the Development Corporation and the local authority will be essential as the provision of many facilities and services required for the developing site; water, electricity, sewage disposal, education, health services, etc., still remain the responsibility of the latter. Where this necessary provision is beyond the technical and financial resources of the local authority, the Corporation may assist by undertaking the works themselves or by making a financial contribution.



KEY

-  RESIDENTIAL
-  COMMERCIAL
-  OPEN SPACES
- PS** PRIMARY SCHOOL
- SS** SECONDARY SCHOOL
- PB** PUBLIC BUILDINGS
- M** MARKET
-  INITIAL DEVELOPMENT
-  FUTURE DEVELOPMENT



PROPOSED INITIAL DEVELOPMENT

GLOSSARY

The criteria for the preparation of the definitions have been as follows:

-FIRST PREFERENCE: definitions from "Webster's Third New International Dictionary", Merriam-Webster, 1971.

-SECOND PREFERENCE: definitions from technical dictionaries, text books, or reference manuals.

-THIRD PREFERENCE: definitions from the Urban Settlement Design Program (U.S.D.P.) Files. They are used when existing sources were not quite appropriate/satisfactory.

Words included for specificity and to focus on a particular context are indicated in parenthesis.

Sources of definitions are indicated in parenthesis. (See also: REFERENCES).

ACCESSES. The pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation systems, and other systems such as: waterways, airlines, etc.) (U.S.D.P.)

ACTUAL LAND COST. "(The cost of land is)...set solely by the level of demand. The price of land is not a function of any cost conditions; it is set by the users themselves in competition." (Turner, 1971)

AD VALOREM (TAX). A tax based on a property's value; the value taxed by local governments is not always or even usually the market value, but only a valuation for tax purposes. (U.S.D.P.)

AIRPORT DISTURBANCE. The act or process of destroying the rest, tranquility, or settled state of (the site by the annoyance of airport noise, vibration, hazards, etc.) (Merriam-Webster, 1971)

AIRPORT ZONING RESTRICTIONS. The regulation of the height or type of structures in the path of moving aircraft. (Abrams, 1971)

ALTERNATING CURRENT (A.C.) (an electric) current that reverses its direction of flow at regular intervals. (ROTC ST 45-7, 1953)

AMENITY. Something that conduces to physical or material comfort or convenience, or which contributes satisfaction rather than money income to its owner. (Merriam-Webster, 1971)

AMPERES. Amperes (amp) are a measure of the rate of flow of electricity. It is somewhat comparable to the rate of flow of water (quantity/time). A steady current produced by one volt applied across a resistance of one ohm. (ROTC ST 45-7, 1953)

APPRAISAL. An estimate and opinion of value, especially by one fitted to judge. (Merriam-Webster, 1971)

APPROACHES. The main routes external to the site (pedestrian/vehicular) by which the site can be reached from other parts of the urban context. (U.S.D.P.)

ASSESSED VALUE. A valuation placed upon property by a public officer or board as a basis for taxation. (Keyes, 1971)

ASSESSMENT. The valuation of property for the purpose of levying a tax or the amount of the tax levied. (Keyes, 1971)

BACKFILL. Earth or other material used to replace material removed during construction, such as in culvert, sewer, and pipeline trenches and behind bridge abutments and retaining walls or between an old structure and a new lining. (DePina, 1972)

BARRIER. (A boundary) as a topographic feature or a physical or psychological quality that tends to separate or restrict the free movement (to and from the site). (Merriam-Webster, 1971)

BETTERMENT (TAX). A tax on the increment in value accruing to an owner because of development and improvement work carried out by local authorities. (U.S.D.P.)

BINDER COURSE. A transitional layer of bituminous paving between the crushed stone base and the surface course (to increase bond between base and surface course). (DePina, 1972)

BITUMINOUS. A coating of or containing bitumin; as asphalt or tar. (DePina, 1972)

BLOCK. A block is a portion of land bounded and served by lines of public streets. (U.S.D.P.)

BOUNDARY. Something (a line or area) that fixes or indicates a limit or extent (of the site). (Merriam-Webster, 1971)

BUILDING CODE. "A body of legislative regulations or by-laws that provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures within the city, and certain equipment specifically regulated therein." (BOCA, 1967)

BUILDING DRAIN. Lowest horizontal piping of the building drainage system receiving discharge from soil, waste, and other drainage pipes. It is connected to the building sewer. (ROTC ST 45-7, 1953)

BUILDING MAIN. Water-supply pipe and fittings from the water main or other source of supply to the first branch of the water-distribution system of a building. (ROTC ST 45-7, 1953)

CESS POOL. An underground catch basin that is used where there is no sewer and into which household sewage or other liquid waste is drained to permit leaching of the liquid into the surrounding soil. (Merriam-Webster, 1971)

CIRCULATION. System(s) of movement/passage of people, goods from place to place; streets, walkways, parking areas. (U.S.D.P.)

CLAY. A lusterless colloidal substance, plastic when moist (crystalline grains less than 0.002mm in diameter). (U.S.D.P.)

CLEANOUT. A plug or similar fitting to permit access to traps or sewer lines. Cleanouts are usually used at turns and other points of collection. (ROTC ST 45-7, 1953)

CLIMATE. The average condition of the weather at a particular place over a period of years as exhibited by temperature, wind, precipitation, sun energy, humidity, etc. (Merriam-Webster, 1971)

COLLECTION SYSTEM. The system of pipes in a sewage network, comprised of house service, collection lines, manholes, laterals, mains. (U.S.D.P.)

COMBINED SEWER. A sewer that carries both storm water and sanitary or industrial wastes. (DePina, 1972)

COMMUNITY. The people living in a particular place or region and usually linked by common interests: the

region itself; any population cluster. (U.S.D.P.)

COMMUNITY FACILITIES/SERVICES. Facilities/services used in common by a number of people. It may include: schools, health, recreation, police, fire, public transportation, community center, etc. (U.S.D.P.)

COMMUNITY RECREATION FACILITIES. Facilities for activities voluntarily undertaken for pleasure, fun, relaxation, exercise, self-expression, or release from boredom, worry, or tension. (U.S.D.P.)

COMPONENT. A constituent part of the utility network. (U.S.D.P.)

CONDOMINIUM. Condominium is a system of direct ownership of a single unit in a multi-unit whole. The individual owns the unit in much the same manner as if it were a single family dwelling; he holds direct legal title to the unit and a proportionate interest in the common land and areas. Two types of condominiums are recognized: *HORIZONTAL*: detached, semi-detached, row/grouped dwelling types; *VERTICAL*: walk-up, high-use dwelling types. (U.S.D.P.)

CONDUCTORS. Materials which allow current to flow such as aluminum, copper, iron. (ROTC ST 45-7, 1953)

CONDUIT. A pipe or other opening, buried or above ground, for conveying hydraulic traffic, pipelines, cables, or other utilities. (DePina, 1972)

CONSERVATION EASEMENT. An easement acquired by the public and designed to open privately owned lands for recreational purposes or to restrict the use of private land in order to preserve open space and protect certain natural resources. (U.S.D.P.)

CONSTRUCTION BORING. A subsurface boring done at the planned location of all infrastructure and building footings and roadway sub-bases for design of foundation systems. (U.S.D.P.)

CONVEYANCE. The transfer of ownership (of land). (Merriam-Webster, 1971)

CORPORATION COCK/CORPORATION STOP. A water or gas cock by means of which utility-company employees connect or disconnect service lines to a consumer. (Merriam-Webster, 1971)

COSTS OF URBANIZATION. Include the following: *CAPITAL*: cost of land and infrastructure; *OPERATING*: cost of administration, maintenance, etc.; *DIRECT*: include capital and operating costs; *INDIRECT*: include environmental and personal effects. (U.S.D.P.)

CURRENT (See: *ALTERNATING CURRENT*, *DIRECT CURRENT*). An electric current is a movement of positive or negative electric particles (as electrons) accompanied by such observable effects as the production of heat, of a magnetic field, or of chemical transformation. (Merriam-Webster, 1971)

CYCLE. One complete performance of a vibration, electric oscillation, current alternation, or other periodic process. (Merriam-Webster, 1971)

DAM. A barrier preventing the flow of water; a barrier built across a water course to confine and keep back flowing water. (Merriam-Webster, 1971)

DEPRECIATION ACCELERATION (TAX). A tax incentive designed to encourage new construction by allowing a faster write-off during the early life of a building. (U.S.D.P.)

DESIGN. 1) The arrangement of elements that make up a work of art, a machine or other man-made object. 2) The process of selecting the means and contriving the elements, steps, and procedures for producing what will adequately satisfy some need. (Merriam-Webster, 1971)

DETACHED DWELLING. Individual dwelling unit, separated from others. (U.S.D.P.)

DEVELOPMENT. Gradual advance or growth through progressive changes; a developed tract of land (U.S.D.P.)

DEVELOPMENT SIZE. There are two general ranges of size: *LARGE*: may be independent communities requiring their own utilities, services, and community facilities; *SMALL*: generally are part of an adjacent urbanization and can use its supporting utilities, services, and community facilities. (U.S.D.P.)

DIRECT CURRENT (D.C.) (An electric current that) flows continuously in one direction. (ROTC ST 45-7, 1953)

DISCHARGE (Q). Flow from a culvert, sewer, channel, etc. (DePina, 1972)

DISTANCE. The degree or amount of separation between two points (the site and each other element of the urban context) measured along the shortest path adjoining them (paths of travel). (Merriam-Webster, 1971)

DISTRIBUTION (STATION). The part of an electric supply system between bulk power sources (as generating stations or transformation station tapped from transmission lines) and the consumers' service switches. (Merriam-Webster, 1971)

DISTURBED SOIL. Soils that have been disturbed by artificial process, such as excavation, transportation, and compaction in fill. (U.S.D.P.)

DRAINAGE. Interception and removal of ground water or surface water, by artificial or natural means. (DePina, 1972)

DUST/DIRT. Fine dry pulverized particles of earth, grit, refuse, waste, litter, etc. (Merriam-Webster, 1971)

DWELLING. The general, global designation of a building/shelter in which people live. A dwelling contains one or more 'dwelling units'. (U.S.D.P.)

DWELLING BUILDER. Four groups are considered: *SELF-HELP BUILT*: where the dwelling unit is directly built by the user or occupant; *ARTISAN BUILT*: where the dwelling unit is totally or partially built by a skilled craftsman hired by the user or occupant; payments can be monetary or an exchange of services; *SMALL CONTRACTOR BUILT*: where the dwelling unit is totally built by a small organization hired by the user, occupant, or developer; 'small' contractor is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwelling units or single complexes; *LARGE CONTRACTOR BUILT*: where the dwelling unit is totally built by a large organization hired by a developer; 'large' contractor is defined by the scale of operations, financially and materially; the scale reflects a more comprehensive and larger size of operations encompassing the building of large quantities of similar units, or a singularly large complex. (U.S.D.P.)

DWELLING DENSITY. The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density of an overall area (ex. including lots, streets). Net density is the density of selected, discrete portions of an area (ex. including only lots). (U.S.D.P.)

DWELLING DEVELOPER. Three sectors are considered in the supply of dwellings: *POPULAR SECTOR*: the marginal sector with limited or no access to the formal financial, administrative, legal, technical institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular Sector generally for 'self use' and sometimes for profit. *PUBLIC SEC-*

TOR: the government or non-profit organizations involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Public Sector for service (non-profit or subsidized housing). **PRIVATE SECTOR:** the individuals, groups or societies, who have access to the formal financial, administrative, legal, technical institutions in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Private Sector for profit. (U.S.D.P.)

DWELLING DEVELOPMENT MODE. Two modes are considered: **PROGRESSIVE:** the construction of the dwelling and the development of the local infrastructure to modern standards by stages, often starting with provisional structures and underdeveloped land. This essentially traditional procedure is generally practiced by squatters with de facto security of tenure and an adequate building site. **INSTANT:** the formal development procedure in which all structures and services are completed before occupation. (U.S.D.P.)

DWELLING FLOORS. The following numbers are considered: **ONE:** single story; generally associated with detached, semi-detached and row/group dwelling types. **TWO:** double story; generally associated with detached, semi-detached and row/group dwelling types. **THREE OR MORE:** generally associated with walk-up and high-rise dwelling types. (U.S.D.P.)

DWELLING GROUP. The context of the dwelling in its immediate surroundings. (U.S.D.P.)

DWELLING/LAND SYSTEM. A distinct dwelling environment/housing situation characterized by its users as well as by its physical environment. (U.S.D.P.)

DWELLING LOCATION. Three sectors are considered in single or multi-center urban areas. Sectors are identified by position as well as by the density of buildings as follows: **CENTER:** the area recognized as the business center of the city, generally the most densely built-up sector; **INNER RING:** the area located between the city center and the urban periphery, generally a densely built-up sector; **PERIPHERY:** the area located between the inner ring and the rural areas, generally a scatteredly built-up sector. (U.S.D.P.)

DWELLING PHYSICAL STATE. A qualitative evaluation of the physical condition of the dwelling types: room, apartment, house; the shanty unit is not evaluated. **BAD:** generally poor state of structural stability, weather protection, and maintenance. **FAIR:** generally acceptable state of structural stability, weather protection, and maintenance with some deviation. **GOOD:** generally acceptable state of structural stability, weather protection, and maintenance without deviation. (U.S.D.P.)

DWELLING TYPE. The physical arrangement of the dwelling unit: **DETACHED:** individual dwelling unit, separated from others. **SEMI-DETACHED:** two dwelling units sharing a common wall (duplex). **ROW/CROUPED:** dwelling units grouped together linearly or in clusters. **WALK-UP:** dwelling units grouped in two to five stories with stairs for vertical circulation. **HIGH-RISE:** dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

DWELLING UNIT. A self-contained unit in a dwelling for an individual, a family, or a group. (U.S.D.P.)

DWELLING UNIT AREA. The dwelling unit area (m²) is the built-up, covered area of a dwelling unit. (U.S.D.P.)

DWELLING UNIT COST. The initial amount of money paid for the dwelling unit or the present monetary equivalent for replacing the dwelling unit. (U.S.D.P.)

DWELLING UNIT TYPE. Four types of dwelling units are considered: **ROOM:** A SINGLE SPACE usually bounded by

partitions and specifically used for living; for example, a living room, a dining room, a bedroom, but not a bath/toilet, kitchen, laundry, or storage room. **SEVERAL ROOM UNITS** are contained in a building/shelter and share the use of the parcel of land on which they are built (open spaces) as well as common facilities (circulation, toilets, kitchens). **APARTMENT:** A MULTIPLE SPACE (room/set of rooms with bath, kitchen, etc.) **SEVERAL APARTMENT UNITS** are contained in a building and share the use of the parcel of land on which they are built (open spaces) as well as some common facilities (circulation). **HOUSE:** A MULTIPLE SPACE (room/set of rooms with or without bath, kitchen, etc.) **ONE HOUSE UNIT** is contained in a building/shelter and has the private use of the parcel of land on which it is built (open spaces) as well as the facilities available. **SHANTY:** A SINGLE OR MULTIPLE SPACE (small, crudely built). **ONE SHANTY UNIT** is contained in a shelter and shares with other shanties the use of the parcel of land on which they are built (open spaces). (U.S.D.P.)

DWELLING UTILIZATION. The utilization indicates the type of use with respect to the number of inhabitants/families. **SINGLE:** an individual or family inhabiting a dwelling. **MULTIPLE:** a group of individuals or families inhabiting a dwelling. (U.S.D.P.)

EASEMENT. Servitude: a right in respect of an object (as land owned by one person) in virtue of which the object (land) is subject to a specified use or enjoyment by another person or for the benefit of another thing. (Merriam-Webster, 1971)

EFFICIENCY. Capacity to produce desired results with a minimum expenditure of energy, time, money or materials. (Merriam-Webster, 1971)

EFFLUENT. Outflow or discharge from a sewer or sewage treatment equipment. (DePina, 1972)

ELECTRIC FEEDER. That part of the electric distribution system between the transformer and the service drop or drops. (HUD, Mobile Court Guide, 1970)

ELECTRIC SERVICE DROP. That part of the electric distribution system from a feeder to the user's service equipment serving one or more lots. (HUD, Mobile Court Guide, 1970)

ELECTRIC TRANSFORMER. A device which changes the magnitude of alternating voltages and currents; generally from distribution voltages to user voltages; a distribution component that converts power to usable voltage. (TM 5 765 US Army, 1970; U.S.D.P.)

ELECTRICAL CIRCUIT. A closed, complete electrical path with various connected loads. Circuits may either be 'parallel' (voltage constant for all connected loads) or 'series' (voltage divided among connected loads). Parallel circuits are fixtures wired independent of each other, which are used in nearly all building wiring. (U.S.D.P.; ROTC ST 45-7, 1953)

ELECTRICAL FREQUENCY. The number of times an alternating electric current changes direction in a given period of time. Measured in cycles per second: hertz. (ROTC ST 45-7, 1953)

ELECTRIC GROUND. The electrical connection with the earth or other ground. (Merriam-Webster, 1971)

ELECTRICAL NETWORK COMPONENTS. It is composed of the following: **GENERATION:** produces electricity; **TRANSMISSION:** transports energy to user groups; **DISTRIBUTION STATION:** divides power among main user groups; **SUBSTATION:** manipulates power into useful energy levels for consumption; **DISTRIBUTION NETWORKS:** provides electric service to user. (U.S.D.P.)

ELECTRIC PHASE. May be either a single-phase circuit (for small electrical devices) or a three-phase circuit (for heavy equipment, large electrical devices). In single-phase only one current is flowing through

the circuit with the voltage dropping to zero twice in each cycle. In three-phase currents flow through the circuit with the power never dropping to zero. (U.S.D.P.)

ELECTRICAL POWER. The source or means of supplying energy for use; measured in watts. (U.S.D.P.)

ELECTRICAL WIRING SYSTEMS. May either be single-phase or three-phase. **SINGLE-PHASE:** 2 hot wires with 1 neutral wire; **THREE-PHASE:** 3 hot wires with 1 neutral wire. (ROTC ST 45-7, 1953)

ELECTRICITY. Electrification: the process (network) for supplying (the site) with electric power. (Merriam-Webster, 1971)

EMBANKMENT (or FILL). A bank of earth, rock, or other material constructed above the natural ground surface. (DePina, 1972)

EROSION. The general process whereby materials of the earth's crust are worn away and removed by natural agencies including weathering, solution, corrosion, and transportation; (specific) land destruction and simultaneous removal of particles (as of soil) by running water, waves and currents, moving ice, or wind. (Merriam-Webster, 1971)

EXCRETA. Waste matter eliminated from the body. (U.S.D.P.)

EXISTING STRUCTURE. Something constructed or built (on the site). (U.S.D.P.)

EXPLORATORY BORING. Initial subsurface investigations (borings) are done on a grid superimposed on the areas of interest and on areas indicated as limited/restricted/hazard in the initial survey. (U.S.D.P.)

EXTERIOR CIRCULATION/ACCESSES (SITE PLANNING). The existing and proposed circulation system/accesses outside but affecting the site. These include limited access highways as well as meshing access to the surrounding area. Exterior circulation/accesses are generally given conditions. (U.S.D.P.)

FAUCET (also TAP). A fixture for drawing liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

FINANCING. The process of raising or providing funds. **SELF FINANCED:** provided by own funds; **PRIVATE/PUBLIC FINANCED:** provided by loan; **PUBLIC SUBSIDIZED:** provided by grant or aid. (U.S.D.P.)

FIRE/EXPLOSION HAZARDS. Danger: the state of being exposed to harm; liable to injury, pain, or loss from fire/explosion (at or near the site). (Merriam-Webster, 1971)

FIRE FLOW. The quantity (in time) of water available for fire-protection purposes in excess of that required for other purposes. (Merriam-Webster, 1971)

FIRE HYDRANT. A water tap to which fire hoses are connected in order to smother fires. (U.S.D.P.)

FIRE PROTECTION. Measures and practices for preventing or reducing injury and loss of life or property by fire. (Merriam-Webster, 1971)

FLEXIBLE PAVEMENT. A pavement structure which maintains intimate contact with and distributes loads to the subgrade and depends upon aggregate interlock, particle friction, and cohesion for stability. (DePina, 1972)

FLOODING. A rising and overflowing of a body of water that covers land not usually under water. (U.S.D.P.)

FLOODWAY FRINGE. The floodplain area landward of the natural floodway which would be inundated by low velocity flood waters. (U.S.D.P.)

FLOW METER. A device to measure flow of water. (U.S.D.P.)

FLUSH TANK TOILET. Toilet with storage tank of water used for flushing bowl. (U.S.D.P.)

FLUSH VALVE TOILET. Toilet with self-closing valve which supplies water directly from pipe. It requires adequate pressure for proper functioning. (U.S.D.P.)

FOOT CANDLE. A unit of illuminance on a surface that is everywhere one foot from a uniform point source of light of one candle and equal to one lumen per square foot. (Merriam-Webster, 1971)

FUMES. Gaseous emissions that are usually odorous and sometimes noxious. (Merriam-Webster, 1971)

GAS. A system for supplying natural gas, manufactured gas, or liquefied petroleum gas to the site and individual users. (U.S.D.P.)

GRADE. Profile of the center of a roadway, or the invert of a culvert or sewer. (DePina, 1972)

GRID BLOCKS. The block determined by a convenient public circulation and not by dimensions of lots. In grid blocks some lots have indirect access to public streets. (U.S.D.P.)

GRIDIRON BLOCKS. The blocks determined by the dimensions of the lots. In gridiron blocks all the lots have direct access to public streets. (U.S.D.P.)

GRID LAYOUTS. The urban layouts with grid blocks. (U.S.D.P.)

GRIDIRON LAYOUTS. The urban layouts with gridiron blocks. (U.S.D.P.)

GOVERNMENT/MUNICIPAL REGULATIONS. In urban areas, the development of the physical environment is a process usually controlled by a government/municipality through all or some of the following regulations: Master Plan, Zoning Ordinance, Subdivision Regulations, Building Code. (U.S.D.P.)

HEAD. (Static). The height of water above any plane or point of reference. Head in feet = (lb/sq. in. x 144)/(Density in lb/cu. ft.) For water at 68°F. (DePina, 1972)

HIGH-RISE. Dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

HOT WIRE. Wire carrying voltage between itself and a ground. (ROTC ST 45-7, 1953)

HYDRAULICS. That branch of science or engineering that deals with water or other fluid in motion. (DePina, 1972)

ILLEGAL. That which is contrary to or violating a rule or regulation or something having the force of law. (Merriam-Webster, 1971)

INCOME. The amount (measured in money) of gains from capital or labor. The amount of such gain received by a family per year may be used as an indicator of income groups. (U.S.D.P.)

INCOME GROUPS. A group of people or families within the same range of incomes. (U.S.D.P.)

INCREMENT (TAX). A special tax on the increased value of land, which is due to no labor/expenditure by the owner, but rather to natural causes such as the increase of population, general progress of society, etc. (U.S.D.P.)

INFRASTRUCTURE. The underlying foundation or basic framework for utilities and services: streets; sewage, water network; storm drainage, electrical network;

gas network; telephone network, public transportation; police and fire protection; refuse collection, health, schools, playgrounds, parks, open spaces. (U.S.D.P.)

INSULATOR. A material or body that is a poor conductor of electricity, heat, or sound. (Merriam-Webster, 1971)

INTERIOR CIRCULATION NETWORK (SITE PLANNING). The pedestrian/vehicular circulation system inside the site. It should be designed based upon the exterior circulation/accesses and land development requirements. (U.S.D.P.)

INTERVAL. A space of time (or distance) between the recurrences of similar conditions or states. (Merriam-Webster, 1971)

KILOWATT (kw). (1000 watts) A convenient manner of expressing large wattages. Kilowatt hours (kwh) measure the total quantity of energy consumed in a given time. One kwh represents the use of an average of 1 kilowatt of electrical energy for a period of 1 hour. (ROTC ST 45-7, 1953)

LAMPHOLE. A vertical pipe or shaft leading from the surface of the ground to a sewer, for admitting light for purposes of inspection. (U.S.D.P.)

LAND COST. Price: the amount of money given or set as the amount to be given as a consideration for the sale of a specific thing (the site). (Merriam-Webster, 1971)

LAND DEVELOPMENT COSTS. The costs of making raw land ready for development through the provision of utilities, services, accesses, etc. (U.S.D.P.)

LAND LEASE. The renting of land for a term of years for an agreed sum; leases of land may run as long as 99 years. (U.S.D.P.)

LAND-MARKET VALUE. Refers to: 1) the present monetary equivalent to replace the land; 2) the present tax based value of the land; or 3) the present commercial market value of the land. (U.S.D.P.)

LAND OWNERSHIP. The exclusive right of control and possession of a parcel of land. (U.S.D.P.)

LAND SUBDIVISION. The division of the land in blocks, lots and laying out streets. (U.S.D.P.)

LAND TENANCY. The temporary holding or mode of holding a parcel of land of another. (U.S.D.P.)

LAND UTILIZATION. A qualification of the land around a dwelling in relation to user, physical controls and responsibility. **PUBLIC** (streets, walkways, open spaces): user -anyone/unlimited; physical controls -minimum; responsibility -public sector. **SEMI-PUBLIC** (open spaces, playgrounds, schools): user -limited group of people; physical controls -partial or complete; responsibility -public sector and user. **PRIVATE** (dwellings, lots): user -owner or tenant or squatter; physical controls -complete; responsibility -user. **SEMI-PRIVATE** (cluster courts): user -group of owners and/or tenants; physical controls -partial or complete; responsibility -user. (U.S.D.P.)

LAND UTILIZATION: PHYSICAL CONTROLS. The physical/legal means or methods of directing, regulating, and coordinating the use and maintenance of land by the owners/users. (U.S.D.P.)

LAND UTILIZATION: RESPONSIBILITY. The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users. (U.S.D.P.)

LATERAL SEWER. A collector pipe receiving sewage from building connection only. (U.S.D.P.)

LATRINE. A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or

a room (as in a barracks or hospital) or enclosure (as in a camp) containing such a receptacle. (Merriam-Webster, 1971)

LAYOUT. The plan or design or arrangement of something that is laid out. (Merriam-Webster, 1971)

LEVELS OF SERVICES. Two levels are considered: **MINIMUM**, are admissible or possible levels below the standard; **STANDARD**, are levels set up and established by authority, custom of general consent, as a model, example or rule for the measure of quantity, weight extent, value or quality. (U.S.D.P.)

LIFT PUMP. A collection system component that forces sewage to a higher elevation to avoid deep pipe networks. (U.S.D.P.)

LOCALITY. A relatively self-contained residential area/community/neighborhood/settlement within an urban area which may contain one or more dwelling/land systems. (U.S.D.P.)

LOCALITY SEGMENT. A 400m x 400m area taken from and representing the residential character and layout of a locality. (U.S.D.P.)

LOCATION. Situation: the way in which something (the site) is placed in relation to its surroundings (the urban context). (Merriam-Webster, 1971)

LOT. A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)

LOT CLUSTER. A group of lots (owned individually) around a semipublic common court (owned in condominium). (U.S.D.P.)

LOT COVERAGE. The ratio of building area to the total lot area. (U.S.D.P.)

LOT PROPORTION. The ratio of lot width to lot depth. (U.S.D.P.)

LUMINAIRE. In highway lighting, a complete lighting device consisting of a light source, plus a globe, reflector, refractor, housing and such support as is integral with the housing. (DePina, 1972)

MANHOLE. An access hole sized for a man to enter, particularly in sewer and storm drainage pipe systems for cleaning, maintenance and inspection. (U.S.D.P.)

MATRIX (OF BASIC REFERENCE MODELS). A set of models of urban layouts arranged in rows and columns. (U.S.D.P.)

MASTER PLAN. A comprehensive, long range plan intended to guide the growth and development of a city, town or region, expressing official contemplations on the course its transportation, housing and community facilities should take, and making proposals for industrial settlement, commerce, population distribution and other aspects of growth and development. (Abrams, 1972)

MEDIAN BARRIER. A double-faced guard rail in the median or island dividing two adjacent roadways. (DePina, 1972)

MESHING BOUNDARIES. Characterized by continuing, homogeneous land uses or topography expressed as: **LINES:** property lines, political or municipal divisions, main streets, etc.; **AREAS:** similar residential uses, compatible uses (as parks with residential). (U.S.D.P.)

MICROCLIMATE. The local climate of a given site or habitat varying in size from a tiny crevice to a large land area, but being usually characterized by considerable uniformity of climate. (Merriam-Webster, 1971)

MODE OF TRAVEL. Manner of moving from one place (the

site) to another (other parts of the urban context). (U.S.D.P.)

MODEL (OF URBAN LAYOUT). A representation of an urban residential area illustrating circulation, land utilization, land subdivision, and utility network of a specific layout and lot. (U.S.D.P.)

MUTUAL OWNERSHIP. Private land ownership shared by two or more persons and their heir under mutual agreement. (U.S.D.P.)

NATURAL FEATURES. Prominent objects in or produced by nature. (U.S.D.P.)

NATURAL UNDISTURBED SOIL. Soils that have not been disturbed by artificial process. Although natural, they depend greatly on local conditions, environment, and past geological history of the formations. (U.S.D.P.)

NEIGHBORHOOD. A section lived in by neighbors and having distinguishing characteristics. (U.S.D.P.)

NETWORK EFFICIENCY (LAYOUT EFFICIENCY). The ratio of the length of the network to the area(s) contained within; or tangent to it. (U.S.D.P.)

NEUTRAL WIRE. Wire carrying no voltage between itself and a ground. (ROTC ST 45-7, 1953)

NOISE. Any sound (affecting the site) that is undesired (such as that produced by: traffic, airports, industry, etc.) (Merriam-Webster, 1971)

ODOR. A quality of something that affects the sense of smell. (Merriam-Webster, 1971)

OHMS (electrical). The unit of resistance to the flow electricity. The higher the number of ohms, the greater the resistance. When resistance is constant, amperage (and wattage) are in direct proportion to voltage. Resistance varies inversely with the cross-sectional area of the wire. Ohms = volts/amperes. $R = E/I$. The practical mks unit of electrical resistance that is equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere or to the resistance in which one watt of power is dissipated when one ampere flows through it and that is taken as standard in the U.S. (U.S.D.P.; ROTC ST 45-7, 1953; Merriam-Webster, 1971)

OPTIMIZE/OPTIMIZE. To bring to a peak of economic efficiency, specially by the use of precise analytical methods. (Merriam-Webster, 1971)

ORGANIC SOILS. Soils composed mostly of plant material. (U.S.D.P.)

OXIDATION POND (LAGOON). A method of sewage treatment using action of bacteria and algae to digest/decompose wastes. (U.S.D.P.)

PERCENT RENT/MORTGAGE. The fraction of income allocated for dwelling rental or dwelling mortgage payments; expressed as a percentage of total family income. (U.S.D.P.)

PIT PRIVY/LATRINE. A simple hole in the ground, usually hand dug, covered with slab and protective superstructure; for disposal of human excreta. (U.S.D.P.)

PLANNING. The establishment of goals, policies, and procedures for a social or economic unit, i.e. city. (U.S.D.P.)

PLOT/LOT. A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)

POLICE PROTECTION. Police force: a body of trained men and women entrusted by a government with the maintenance of public peace and order, enforcement of laws, prevention and detection of crime. (Merriam-

Webster, 1971)

POPULATION DENSITY. It is the ratio between the population of a given area and the area. It is expressed in people per hectare. It can be: **GROSS DENSITY:** includes any kind of land utilization, residential, circulation, public facilities, etc. **NET DENSITY:** includes only the residential land and does not include land for other uses. (U.S.D.P.)

POSITION. The point or area in space actually occupied by a physical object (the site). (Merriam-Webster, 1971)

PRIMER. A small introductory book on a specific subject. (U.S.D.P.)

PRIVATE LAND OWNERSHIP. The absolute tenure of land to a person and his heirs without restriction of time. (U.S.D.P.)

PRIVY. A small, often detached building having a bench with one or more round or oval holes through which the user may defecate or urinate (as into a pit or tub) and ordinarily lacking any means of automatic discharge of the matter deposited. (Merriam-Webster, 1971)

PROJECT. A plan undertaken; a specific plan or design. (U.S.D.P.)

PUBLIC CIRCULATION. The circulation network which is owned, controlled, and maintained by public agencies and is accessible to all members of a community. (U.S.D.P.)

PUBLIC FACILITIES. Facilities such as schools, playgrounds, parks, other facilities accessible to all members of a community which are owned, controlled, and maintained by public agencies. (U.S.D.P.)

PUBLIC SERVICES AND COMMUNITY FACILITIES. Includes: public transportation, police protection, fire protection, refuse collection, health, schools, and playgrounds, recreation and open spaces, other community facilities, business, commercial, small industries, markets. (U.S.D.P.)

PUBLIC SYSTEM (general). A system which is owned and operated by a local governmental authority or by an established public utility company which is controlled and regulated by a governmental authority. (HUD/AID, Minimum Standards, 1966)

PUBLIC UTILITIES. Includes: water supply, sanitary sewerage, storm drainage, electricity, street lighting, telephone, circulation networks. (U.S.D.P.)

PUMP. A device or machine that raises, transfers, or compresses fluids or that attenuates gases especially by suction or pressure or both. (Merriam-Webster, 1971)

REFUSE COLLECTION. The service for collection and disposal of all the solid wastes from a community. (U.S.D.P.)

RESERVOIR. Large-scale storage of water; also functions to control fluctuations in supply and pressure. (U.S.D.P.)

RESIDENTIAL AREA. An area containing the basic needs/requirements for daily life activities: housing, education, recreation, shopping, work. (U.S.D.P.)

RESISTANCE. The opposition to electrical flow. (Resistance increases as the length of wires is increased and decreases as the cross-sectional area of wires is increased). (ROTC ST 45-7, 1953)

RIGHT-OF-WAY. A legal right of passage over another person's ground (land), the area or way over which a right-of-way exists such as: a path or thoroughfare which one may lawfully use, the strip of land devoted to or over which is built a public road, the land

occupied by a railroad, the land used by a public utility. Rights-of-way may be shared (as streets; pedestrians and automobiles) or exclusive (as rapid transit routes; subways, railroads, etc.) (Merriam-Webster, 1971; U.S.D.P.)

ROADWAY (HIGHWAY). Portion of the highway included between the outside lines of gutter or side ditches, including all slopes, ditches, channels, and appurtenances necessary to proper drainage, protection, and use. (DePina, 1972)

ROW/GROUPED HOUSING. Dwelling units grouped together linearly or in clusters. (U.S.D.P.)

RUNOFF. That part of precipitation carried off from the area upon which it falls. (DePina, 1972)

RUNOFF-RAINFALL RATIO. The percentage (ratio) of stormwater runoff that is not reduced by evaporation, depression storage, surface wetting, and percolation; with increased rainfall duration, runoff-rainfall ratios rise increasing runoff flow. (U.S.D.P.)

SAND. Loose, distinguishable grains of quartz/feldspar, mica (ranging from 2mm to 0.02mm in diameter). (U.S.D.P.)

SANITARY SEWERAGE. The system of artificial usually subterranean conduits to carry off sewage composed of: *excreta*: waste matter eliminated from the human body; *domestic wastes*: used water from a home/community containing 0.1% total solids; and some *industrial wastes*, but not water from ground, surface, or storm. (U.S.D.P.)

SEMI-DETACHED DWELLING. Two dwelling units sharing a common wall (duplex). (U.S.D.P.)

SEPTIC TANK. A tank in which the organic solid matter of continuously flowing sewage is deposited and retained until it has been disintegrated by anaerobic bacteria. (Merriam-Webster, 1971)

SERIES CIRCUIT. Fixtures connected in a circuit by a single wire. When one fixture is out, the circuit is broken. Fixtures with different amperages cannot be used efficiently in the same circuit. (ROTC ST 45-7, 1953)

SETTLEMENT. Occupation by settlers to establish a residence or colony. (U.S.D.P.)

SEWAGE. The effluent in a sewer network. (U.S.D.P.)

SEWER. The conduit in a subterranean network used to carry off water and waste matter. (U.S.D.P.)

SEWER BUILDING CONNECTION. The pipe connecting the dwelling with the sewer network. (U.S.D.P.)

SEWERAGE. Sewerage system: the system of sewers in a city, town or locality. (Merriam-Webster, 1971)

SHAPE. Form/configuration of the site surface as defined by its perimeter/boundaries. (U.S.D.P.)

SHOPPING. (Facilities for) searching for, inspecting, or buying available goods or services. (U.S.D.P.)

SILT. Loose, unconsolidated sedimentary rock particles (ranging from 0.02mm to 0.002mm in diameter). (U.S.D.P.)

SITE. Land (that could be) made suitable for building purposes by dividing into lots, laying out streets and providing facilities. (Merriam-Webster, 1971)

SITE AREAS. Two types are considered: **GROSS AREA:** includes the whole site or the bounded piece of ground. **USABLE AREA:** includes only the portion of the site that can be fully utilized for buildings, streets, playgrounds, recreation facilities, gardens, or other structures. (U.S.D.P.)

SITE AND SERVICES. The subdivision of urban land and the provision of services for residential use and complementary commercial use. Site and services projects are aimed to improve the housing conditions for the low income groups of the population by providing: a) **SITE:** the access to a piece of land where people can build their own dwellings; b) **SERVICES:** the opportunity of access to employment, utilities, services and community facilities, financing and communications. (U.S.D.P.)

SIZE. Physical magnitude or extent (of the site), relative or proportionate dimensions (of the site). (Merriam-Webster, 1971)

SLOPE. Degree or extent of deviation (of the land surface) from the horizontal. (Merriam-Webster, 1971)

SMOKE. The gaseous products of burning carbonaceous materials made visible by the presence of carbon particles. (Merriam-Webster, 1971)

SOIL. Soil structure: the arrangement of soil particles in various aggregates differing in shape, size, stability, and degree of adhesion to one another. (Merriam-Webster, 1971)

SOIL INVESTIGATION. It is the process to find the soil structure and other characteristics. It may include the following stages: initial soil survey, exploratory boring, construction boring. (U.S.D.P.)

SOIL PIPE. The pipe in a dwelling which carries the pipe discharge from water closets. (U.S.D.P.)

SOIL SURVEY (INITIAL). An on-site examination of surface soil conditions and reference to a GENERAL SOIL MAP. It is used to reveal obvious limitations/restrictions/hazards for early planning consideration. (U.S.D.P.)

STACK. The vertical pipe in a dwelling of the soil-, waste-, or vent-pipe systems. (ROTC ST 45-7, 1953)

STANDARD. 1) Something that is established by authority, custom or general consent as a model or example to be followed. 2) Something that is set up and established by authority as a rule for the measure of quantity, weight, extent, value or quality. (Merriam-Webster, 1971)

STANDPIPE. A pipe riser with tap used as a source of water for domestic purposes. (HUD/AID, Minimum Standards, 1966)

STORM DRAINAGE. Storm sewer: a sewer (system) designed to carry water wastes except sewage (exclusively storm water, surface runoff, or street wash). (Merriam-Webster, 1971)

STREET LIGHTING. Illumination to improve vision at night for security and for the extension of activities. (U.S.D.P.)

SUBDIVISION REGULATIONS. Regulations governing the development of raw land for residential or other purposes. (Abrams, 1972)

SUBGRADE. The layer of natural soil or fill (compacted soil) upon which the pavement structure including curbs is constructed. (DePina, 1972)

SUBMAIN or BRANCH SEWER. A collector pipe receiving sewage from lateral sewer only. (U.S.D.P.)

SUBSISTENCE INCOME. The minimum amount of money required for the purchase of food and fuel for an average family to survive. (U.S.D.P.)

SULLAGE. Drainage or refuse especially from a house, farmyard, or street. (Merriam-Webster, 1971)

TAP (also FAUCET). A fixture for drawing a liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

TAX EXEMPTION. A grant by a government of immunity from taxes; (a ten-year tax exemption on new housing in New York stimulated new construction in the 1920's; to ease its housing shortage, Turkey granted a ten-year tax exemption on new buildings). (Abrams, 1966)

TAX INCENTIVE. Favorable tax treatment to induce the beneficiary to do something he would not otherwise be likely to do. (U.S.D.P.)

TAX STRUCTURE - TAXATION. The method by which a nation (state, municipality) implements decisions to transfer resources from the private sector to the public sector. (U.S.D.P.)

TELEPHONE. An electrical voice communication network interconnecting all subscribing individuals and transmitting over wires. (U.S.D.P.)

TENURE. Two situations of tenure of the dwelling units and/or the lot/land are considered: **LEGAL:** having formal status derived from law; **EXTRALEGAL:** not regulated or sanctioned by law. Four types of tenure are considered: **RENTAL:** where the users pay a fee (daily, weekly, monthly) for the use of the dwelling unit and/or the lot/land; **LEASE:** where the users pay a fee for long-term use (generally for a year) for a dwelling unit and/or the lot/land from the owner (an individual, a public agency, or a private organization); **OWNERSHIP:** where the users hold in freehold the dwelling unit and/or the lot/land which the unit occupies; **EMPLOYER-PROVIDED:** where the users are provided a dwelling unit by an employer in exchange for services, i.e. domestic live-in servant. (U.S.D.P.)

TITLE. The instrument (as a deed) that constitutes a legally just cause of exclusive possession (of land, dwellings, or both). (Merriam-Webster, 1971)

TOILET. A fixture for defecation and urination, esp. water closet. (7th Collegiate Webster, 1963)

TOPOGRAPHY. The configuration of a (land) surface including its relief and the position of its natural and man-made features. (Merriam-Webster, 1971)

TRANSPORTATION. Means of conveyance or travel from one place (the site) to another (other parts of the urban context). (Merriam-Webster, 1971)

TRAP. A fitting that provides a water seal to prevent sewer gases and odors being discharged through fixtures. (ROTC ST 45-7, 1953)

TREATMENT WORKS. Filtration plant, reservoirs, and all other construction required for the treatment of a water supply. (ROTC ST 45-7, 1953)

UNIT. A determinate quantity adopted as a standard of measurement for other quantities of the same kind. (Merriam-Webster, 1971)

URBAN TRANSPORTATION. Means of conveyance of passengers or goods from one place to another along ways, routes of circulation in a metropolitan context. (U.S.D.P.)

URBANIZATION. The quality or state of being or becoming urbanized; to cause to take on urban characteristics. (U.S.D.P.)

USE TAX. The tax on land aimed primarily at enforcing its use or improvement. (U.S.D.P.)

USER INCOME GROUPS. Based upon the subsistence (minimum wage) income per year, five income groups are distinguished: **VERY LOW** (below subsistence level): the income group with no household income available for housing, services, or transportation; **LOW** (1 x subsistence level): the income group that can afford no or very limited subsidized housing; **MODERATE** (3 x subsistence level): the income group that can afford limited housing and rent only with government assistance; **HIGH** (5 x subsistence level): the income

group that can afford housing without subsidy, by cash purchase, through mortgage payments, or by rent; **VERY HIGH** (10 x subsistence level): the income group that represents the most economically mobile sector of the population. (U.S.D.P.)

USUFRUCT. The right to profit from a parcel of land or control of a parcel of land without becoming the owner or formal leasee; legal possession by decree without charge. (U.S.D.P.)

UTILITIES. Include: water supply, sanitary sewerage, storm drainage, electricity, street lighting, gas, telephone. (U.S.D.P.)

UTILITY/SERVICE. The organization and/or infrastructure for meeting the general need (as for water supply, wastewater removal, electricity, etc.) in the public interest. (U.S.D.P.)

VALVE. A water supply distribution component which interrupts the supply for maintenance purposes. (U.S.D.P.)

VENT. A pipe opening to the atmosphere, which provides ventilation for a drainage system and prevents trap siphonage or back pressure. (ROTC ST 45-7, 1953)

VIBRATION. A quivering or trembling motion (such as that produced by: heavy traffic, industry, aircraft, etc. (Merriam-Webster, 1971)

VIews. That which is revealed to the vision or can be seen (from the site). (Merriam-Webster, 1971)

WALK-UP. Dwelling units grouped in two to five stories with stairs for vertical circulation. (U.S.D.P.)

WASTE PIPE. A pipe (in a dwelling) which carries water from wash basins, sinks, and similar fixtures. (ROTC ST 45-7, 1953)

WATER SUPPLY. Source, means, or process of supplying water, (as for a community) usually involving reservoirs, pipelines, and often the watershed from which the water is ultimately drawn. (Merriam-Webster, 1971)

WATERSHED. The catchment area or drainage basin from which the waters of a stream or stream system are drawn. (Merriam-Webster, 1971)

WATERWORKS. The whole system of reservoirs, channels, mains, and pumping and purifying equipment by which a water supply is obtained and distributed to consumers. (Merriam-Webster, 1971)

WATT. Watts (w) measure the power of the flow of energy through a circuit. Wattage is the product of volts times amperes. Both watts and horsepower denote the rate of work being done. 746w = 1hp. (ROTC ST 45-7, 1953)

ZONING ORDINANCE. The demarcation of a city by ordinance into zones (areas/districts) and the establishment of regulations to govern the use of land and the location, bulk, height, shape, use, population density, and coverage of structures within each zone. (U.S.D.P.)

EXPLANATORY NOTES

QUALITY OF SERVICES, FACILITIES AND UTILITIES

None: when the existence of services, facilities and utilities are unavailable to a locality.

Limited: when the existence of services, facilities and utilities are available to a locality in a limited manner due to proximity.

Adequate: when the existence of services, facilities and utilities are available in/to a locality.

QUALITY OF INFORMATION

The quality of information given in the drawings have been qualified in the following manner:

Tentative: when based upon rough estimations of limited sources.

Approximate: when deducted from different and/or not completely reliable sources.

Accurate: when taken from the reliable or actual sources.

METRIC SYSTEM EQUIVALENTS

Linear Measures

1 centimeter	= 0.3937 inches
1 meter = 100 centimeters	= 39.37 inches or 3.28 feet
1 kilometer = 1,000 meters	= 3,280.83 feet or 0.62137 miles
1 inch	= 2.54 centimeters
1 foot	= 0.3048 meters
1 mile	= 1.60935 kilometers
1 wa (Thai)	= 2.0 meters

Square Measures

1 square meter	= 1,550 square inches or 10.7639 square feet
1 hectare = 10,000 sq.meters	= 2.4711 acres
1 square foot	= 0.0929 square meters
1 acre	= 0.4087 hectares
1 rai (Thai)	= 1,600 square meters
1 tarang wa (Thai)	= 4 square meters

DOLLAR EQUIVALENTS

All income, cost and rent/mortgage data have been expressed in terms of the U.S. equivalent;

1 U.S. dollar = 20 bahts (Thai)

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